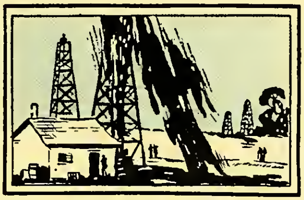
Louisiana Conservation REVIEW



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by
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ARMAND P. DASPIT
Director, Division of Fur and Wild Life

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Bureau of Scientific Research and Statistics

RICHARD B. OTERO, LL.D.
Director,
Bureau of Education

MRS. ESTELLE COTTMAN
B. A. in Education
Assistant Director, Bureau of Education

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JAMES P. GUILLOT.............................Editor
N. E. SIMONEAUX..................Assoc. Editor
ESTELLE V. COTTMAN......Nat. Guar. Ed.

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Pollution Investigations

INDUSTRIAL activities on the American Continent have been notorious agents in the destruction of fish and other wild life through pollution. So serious have been such influences that much study, and where possible, enforced legislation or other corrective measures have been needed to provide an understanding of and a remedy for such damage to natural resources.

However, one type of development of especial importance in relation to many forms of wild life remains as yet obscure, namely the effects of "salt water" brought up together with the oil in the operation of oil wells.

Hitherto such problems have evidently been considered on the basis of either the injurious effects of the salt contained in the water or the quite different but also injurious effects of oil. All other factors, many of them potentially destructive agents have been largely disregarded. It has likewise been assumed that where the "salt water" is disposed of directly into the sea water no pollution exists since it was believed that the salt under such circumstances would merely supplement the sea-salt already present in the environment.

There is now available abundant evidence that such is not the correct interpretation of the facts.

The Bureau of Research and Statistics of the Department of Conservation has undertaken a searching and extensive study of these problems. The necessity for such studies is profound since in Louisiana we have remarkably rich oil fields under production in close proximity to valuable fishing areas, shrimping areas and oyster bedding grounds.

It is thus essential that the needed data be made available to permit the proper exploitation of all of these natural resources without interference of one with another.

The Bureau of Research has already secured what appears to be all information at present available concerning the facts of and the remedies for such pollution problems in other states and has discovered with surprise the great lack of definite data anywhere concerning what has repeatedly become elsewhere a grave question.

Additional to the difficulties involved in the disposal of oil well "salt brines" there exist also the yet unanswered questions concerning the effects of oil itself in the form of oil films and oil emulsions resulting from the accidental escape of oil during oil well operations as well as the further effects, never yet adequately investigated, of dissolved derivatives of gases used in "lifting" the oil. It is obvious that, when these highly diverse and often highly variable factors are superimposed upon the already extremely complicated environment of the sea water, the possible changes in conditions which may arise and the effects of these changes upon animal life, such as oysters, fishes and shrimp present in those waters, become problems of the most involved character.

The Bureau of Research of the Department of Conservation of Louisiana is therefore engaged upon a program of survey, of chemical experiment and of biological investigation that will undoubtedly provide information of the highest significance and value, not only for Louisiana but for conservationists everywhere.

The Department of Conservation in this work is proceeding in closest cooperation with the State Board of Health of Louisiana and it is certain that these joint efforts will shed light upon a conservation problem that has hitherto been obscure.

It is evident from a scientific examination of these problems that they admit of no "easy chair" solution. Experiments, practically designed and painstakingly carried out, must be the instrument by which the desired answers can be gained. Involved in such investigations are not alone extensive experiments, using marine animals in the areas suspected of pollution and "controlling" these experiments by similar individuals from the same population, exposed, however, to normal conditions, but also there must be conducted critical laboratory experiments in which careful adjustment of conditions is maintained so that each effect, by experimental elimination, may be intelligently associated with its cause. More simply stated, the analysis of pollution problems requires a combination of field observations and field experiments on the one hand and on the other hand the conduct in an adequate marine biological station of exacting, yet essential, laboratory proofs of the facts observed in the field. Such is the

(Continued on Page 42)

Commissioner Maestri Broadens Activities of Minerals Division

District Office Established in New Orleans

THE many demands of those interested in the minerals now being developed in south-central and southeast Louisiana has necessitated the establishment of a district office in New Orleans.

This action, taken by Commissioner Rob't. S. Maestri, and Dr. J. A. Shaw, director of the Minerals Division at Shreveport, has been further prompted by the necessity to coordinate the work of the Minerals Division with the present requirements of the National Recovery Administration as it affects the minerals of the state. Moreover, an increased production of oil and drilling in the New Orleans district and the activities and operations of the companies exploiting the mineral resources of southeast Louisiana are additional reasons why an office of the Minerals Division has been established in New Orleans. In addition to the information and material which must be supplied and checked by the Minerals Division, each sub-district is inspected at regular intervals in order to keep the department in close contact with all operations of the oil, sulphur, and gas companies.

Another phase of conservation which has recently become increasingly important in south-central and southeast Louisiana, particularly along the coast, is that of biological research as regards fish life that may be affected by pollutions from oil well effluents. Louisiana fisheries is one of the great industries of the state, finding its principal market in the city of New Orleans. Those interested in this industry have demanded that the department constantly supervise all industrial operations which result in a discharge of waste matter which might prove injurious to the coastal fisheries. Therefore, it has become necessary that the department not only be informed regarding the exploitation of the state's mineral resources, but that it also protect the state's important fish, shrimp, and oyster industries against the waste materials discharged into salt water bodies by such operations.

The district office of the Minerals Division, located in New Orleans, will embrace as its activity, and under its supervision, the parishes of Terrebonne, Lafourche, Jefferson, Plaquemines, St. John the Baptist, Orleans, St. Tammany, St. Bernard, Vermilion, Lafayette, Acadia, St. Martin, Iberia, St. Mary, Assumption, Ascension, Iberville, Point Coupee, West Baton Rouge, East Baton Rouge, Livingston, Washington, St. Helena, Tangipahoa, East Feliciana, and West Feliciana.

A brief survey of present activities in the parishes supervised by the New Orleans office which are being exploited for oil, sulphur, and other minerals at the present time, follows:

Plaquemine Parish: Oil is being produced from the Grand Ecaille Salt Dome by one company and another company is exploiting the sulphur deposit. Wells are also being drilled at Lake Hermitage Salt Dome, Garden Island Bay Salt Dome, and the Adams Bay District.

St. Bernard Parish: One well is being drilled in Lake Borgne and another in Lake Lery.

Terrebonne Parish: Here are the majority of the activities in this district. The Lake Barre field is producing about 8,000 barrels of oil daily, while a few miles south of this field is the Caillou Island field which is producing about 2,300 barrels of oil daily. The Lake Pelto Field is producing about 50 barrels of oil daily. Wells are being drilled in all three of the above mentioned fields and on three other salt domes in this parish, Dog Lake Dome, Bay St. Elaine Dome, and Four Isle Dome.

Lafourche Parish: There are three active areas in this parish. The Leeville field is producing about 375 barrels of oil daily and wells are in the process of drilling. A wildcat well is being drilled a few miles southeast of the town of Lockport, while another well is being drilled at the mouth of Bayou Lafourche.

Assumption Parish: A well is being drilled on the eastern edge of Lake Verrett.

Ascension Parish: The Sorrento Dome in this parish has three wells producing a total of 40 barrels of oil daily and another well drilling. The Darrow Dome is producing a small quantity of oil.

East Baton Rouge Parish: A well, located just south of the Louisiana State University, is in the process of drilling.

Iberville Parish: Oil has been produced from three domes in this parish for some years. However, at the present time there are only two fields active. The White Castle Field has been producing oil for several years and there are two wells producing a total of 450 barrels of oil daily. There are three producing wells on the Choctaw Salt Dome and one well in the process of drilling.

The oil, sulphur, and gas companies have welcomed the action of the Commissioner and have assured full cooperation to the staff of the minerals division located in New Orleans.

KEEP MARSHLANDS FOR WILD FOWL

By
PAUL G. REDINGTON
Chief, U. S. Biological Survey

Much Reclaimed Marshland, Unfit for Agriculture, Should be Rewatered for the Benefit of Water Fowl

OUTSTANDING among the causes of the great decrease in abundance of North American water fowl, has been the destruction of their natural habitat. Migratory water fowl nest and raise their young in the spring and summer months on marsh and water areas in the northern parts of the United States and in Canada. As fall approaches they journey southward in leisurely stages, feeding and resting as they have opportunity, many of them to take up their winter abode in favored places along the south Atlantic, Pacific, and Gulf coasts. With the return of spring, they migrate northward in the same manner, chiefly over the same flight lanes followed in the preceding fall, and the life cycle is again taken up on their northern nesting grounds.

When human settlement spread over the former domain of wild life, the first lands taken by the pioneer farmers were naturally those they could most readily till. Practically all land of this kind, however, had been pre-empted more than a generation ago. Pressure for further agricultural development has become more insistent as the density of human population has constantly increased and as available lands have been appropriated for agriculture and other industrial operations.

Finally, the most attractive areas left for farming were such as could be obtained by drainage and irrigation. Although increased development of irrigation projects had a harmful effect upon the natural habitat of wild fowl, the real disaster to the birds came with the drainage of the marshes, shallow lakes, and ponds. About 77,000,000 acres have thus been drained, much of it without benefit to agriculture, and thus extensive areas of natural environment for migratory birds have been destroyed.

Thus, the resting and feeding grounds on the migration routes have not only in large measure disappeared, but now the birds can frequent such places as remain, only at great peril, by reason of increased natural and human hazards. Ducks and geese can no longer journey in easy stages from one resting and feeding place to another. Instead of spreading out over a great range of country, where previously there had been many places attractive to them, they are now forced to settle in large numbers on relatively restricted areas. There they are even more greatly imperiled

Countless Millions of Wild Geese and Ducks Are Harbored Each Winter in Louisiana's Wild Life Sanctuaries.

Blue Geese in Flight Over the Cameron Parish Marshes Where They Gather in Uncountable Numbers Every Winter

by hunters and by outbreaks of the diseases that are favored by their more dense concentrations.

The water fowl vicissitudes have been further increased by the fact that modern transportation facilities make it much easier for hunters to reach the areas where the birds can still congregate. The development of modern firearms also has made heavier the hunters' toll of the various species. Moreover, situations have arisen on certain of the western marsh areas of this country and in Canada where fluctuation of water levels has made these resting and feeding grounds death traps of disease to the birds. Though the Biological Survey has discovered the nature of the so-called "duck disease," it must be frankly stated that the losses can not be prevented where water levels on alkaline marsh areas of the west can not be controlled.

Sportsmen and conservationists soon realized the danger in these varied conditions to a sustained abundance of wild-bird life. The rapid decrease in the numbers of water fowl encouraged first the passage of the Migratory Bird Law of 1913 and later the negotiation of the treaty of 1916 with Great Britain to protect the birds that migrate between the United States and Canada. This treaty was made effective in this country by the passage of the Migratory Bird Treaty Act of 1918, and in Canada by similar legislation. Under the provisions of the Federal legislation, spring shooting and market hunting of wild fowl have been abolished, and thus a major forward step has been taken looking to the conservation of these birds.

Co-operation in carrying out the terms of the treaty has been all that we could ask for from Canadian officials, both Dominion and provincial. They have problems akin to ours, some differing in degree, and they handle their own affairs as a joint party under the treaty obligation. From the states, as the years go by, heartier co-operation is being shown in the way of state aid in the enforcement of the migratory-bird regulations adopted by the Secretary of Agriculture and in the enactment of legislation conforming with the Secretary's regulations.

Convinced that mere restrictions on hunting would not long save the birds, Congress in 1929 passed another act of equal importance in game conservation, known as the Migratory Bird Conservation Act. This authorized the appropriation of 7,875,000 dollars for the establishment of inviolate migratory-bird refuges, and contemplates that a nation-wide network of refuges shall be

Laughing Gulls Flying in Migration Form

acquired by the Federal Government. Thus far, only a small part of the money has actually been appropriated.

In conducting investigations of proposed refuge areas throughout the country, and bearing in mind the former great extent of favorable water fowl habitat, the Biological Survey has been impressed with the relatively small number of areas not pre-empted by agriculture or for hunting-club grounds that are still naturally attractive to migratory birds. In different parts of the country one or the other of these factors unfavorable to the birds may be dominant. Many lowlands have been unwisely drained for agricultural use. Some have been failures, and others only moderately successful. It is the opinion of many who are well informed that the failures, and possibly many of those places that have been only moderately successful for agricultural exploitation, should be restored to their natural condition.

Something along the line of restoration has been undertaken, but to correct mistakes is costly. A few reclaimed areas have, through abandonment, reverted to a state approaching original conditions, but these are exceptions. Furthermore, many areas that have been abandoned have not yet returned to public ownership, the titles to the lands being still vested in persons who took them up for agricultural use. Though some are tax delinquent, their acquisition by the state is delayed by the great cost of conveyance and clearing titles, such, for example, as the bonded debts created in order to finance the development.

Two examples of efforts to correct unwise drainage and restore the areas to something like their original condition are found in Thief Lake, Minnesota, and the Horicon Marsh, Wisconsin. Thief Lake originally covered more than 7,000 acres. This area, together with Mud Lake, in the same locality and originally containing about 5,000 acres, were among the finest breeding resorts for ducks and geese in Minnesota. Wildfowl food plants, including wild rice and wild celery, annually attracted thousands of canvasbacks, redheads, mallards, widgeons, and other species of water fowl. In the days of the market hunter, literally carloads of water fowl were shipped from these lakes for sale. Not only were water fowl and other birds abundant in and around the lakes, but fish and fur-bearing animals also were found there in large numbers. Moose and deer were frequently taken in the vicinity, and the annual catch of muskrats was an important source of revenue to the farmers living near by.

More than a decade ago Thief and Mud Lakes were entirely drained, at a cost said to have been approximately 1,500,000 dollars. Two main ditches were dug directly through the lakes, and laterals traversed nearly every section line, covering an area about 20 miles wide and 35 miles long. This project, however, was a complete failure from the agricultural standpoint, and by 1929

Commissioner Maestri's Warning Sign to Tresspassers approximately two thirds of the reclaimed lands had become tax delinquent.

To rescue three counties from virtual bankruptcy, the state legislature passed an act to establish game refuges over a large acreage, through the expedient of issuing state certificates of indebtedness and reimbursing the counties. A steel-reinforced concrete dam has now been constructed to retain the water at Thief Lake. Opinions of well-informed persons differ as to its final success, but we are hopeful that in time this area will be restored to something approaching its original natural condition, and again provide an excellent habitat for wild life.

Horicon Marsh, which has been estimated to contain about 40,000 acres, in Dodge County, Wisconsin, was many years ago turned into an extensive lake through the construction of a dam, but in 1868 to help settle a controversy about land ownership, the dam was torn down. By this act the lake bed was converted into a great marsh that extended about 13 miles on both sides of Rock River, thus providing one of the best breeding places in the country.

Two attempts were later made to convert the marsh into farm land by drainage, but neither was entirely successful. Though crop production on some of the drained land compared favorably with that on surrounding farms, there was a vast area too wet for agriculture, though not wet enough for water fowl. After several years' effort by the Izaak Walton League of America and associated groups and individuals, the state legislature in 1927 declared Horicon Marsh a wild-life refuge and authorized the construction of dams to raise the water level and maintain it at the stage existing prior to the drainage.

One of the places along the Atlantic flyway most famous as a resting and a feeding place for migratory birds has been the Back Bay-Currituck Sound region of Virginia and North Carolina. Though this area is not in the same category as Thief Lake and the Horicon Marsh, the modification of water conditions there has had results almost as disastrous to water fowl—in this case through removal of a canal lock. Formerly the aquatic plant life was so prolific, especially the species relished by the birds, that water fowl gathered there in untold numbers. Removing the lock increased the salinity and turbidity of the water, which in turn practically destroyed the plant growth attractive to the birds. The Biological Survey observed the changing conditions over a period of many years, and long ago was convinced that something should be done in the interests of the water fowl. The theory evolved was that the desired improvements could be made by restoring the canal lock, and this has recently been done, by government engineers in co-operation with sportsmen and navigation interests.

The Biological Survey has recommended that conservationists throughout the country undertake to restore or establish small areas of marshland and water that have been attractive to migratory birds. Although such efforts would have chiefly local significance, they would serve to supplement the national program under the Migratory Bird Conservation Act for the preservation of the more extensive areas that still retain their water fowl attractions, and for the restoration of many celebrated water fowl resorts that have been destroyed.

The refuge program of the Biological Survey has been definitely formulated into a policy, which will be carried out when the funds authorized for appropriation under the provisions of the Migratory Bird Conservation Act are in fact appropriated. It will involve the purchase of numerous areas that have been drained without benefit to agriculture. Many of the refuges that up to this time have been established can be improved by restoring natural conditions and thus increasing their wild-life attractiveness. When the original purposes of the act are acomplished the serious conditions that confront our water fowl will be greatly alleviated.

However, not until we can record the establishment of hundreds of well-administered wild-fowl sanctuaries throughout the United States, not until we can reach the point where adequate enforcement of game laws and regulations is possible, not until more funds are made available to conduct research on conditions that face the water fowl—not until then can we be optimistic over the future of all species of bird life and anticipate the continued presence in significant numbers of ducks and geese. To reach such an objective there must be co-operation on the part of all concerned with the welfare of wild life. There must be constructive action by the thousands of gun clubs in the United States, co-operating with such organizations as the National Association of Audubon Societies, the American Ornithologists' Union, the Izaak Walton League of America, the American Game Association, and others. The work will also need the continued interest and support of those thousands of individual men, women, and children who are not shooters but who greatly desire as time goes on to see a plentiful number not only of our migrant water fowl but of the shorebirds and the non-game species, which also are protected under the Migratory Bird Treaty Act.

In these parlous times we know too well that great trouble has come to millions of people throughout the United States. Unemployment is

(Continued on Page 38)

The Pines as Living Fossils of the Plant World

By
ROBERT GLENK, Ph. M.
Curator, Louisiana State Museum

THE history of the pines constitutes one of the surprising romances of the plant life.

The "conebearers" or "conifers" of which the pines and our common cypress are typical examples, originated upon the earth at a much earlier period of geologic time than any other members of our present day forest trees.

Throughout the millions of years of the earth's history, they have persisted in much the same simple biological form since the Coal Age.

Convincing proof of their long existence occurs plentifully in the records of the rocks, and definitely marks them as the oldest living representatives of the forests of the Paleozoic Era.

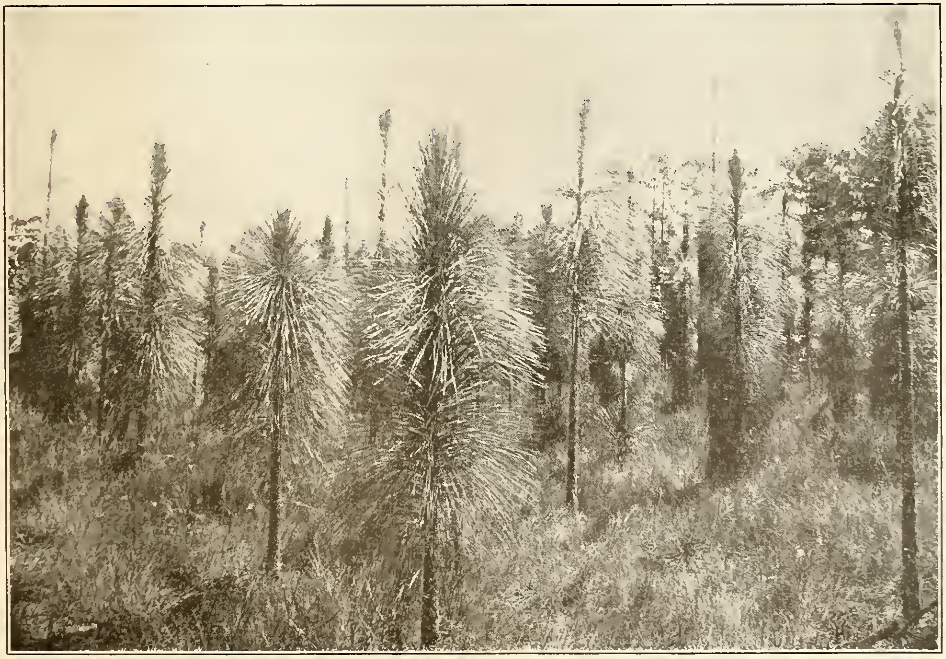
This curiously interesting group of plants retains the primitive flower structure which distinguishes the vegetation of the ancient world. In fact, so close is the resemblance to the rudimentary forms of plant life, most of which have long ceased to exist, that the stock is considered as having lived at the same time as the cycads, giant mosses, and sigillarias whose collective fossil remains make up the bulk of the coal which was formed a hundred millon or more years ago.

In a casual examination of one of the stately pines that constitute to a large degree the forests of the North temperate zone, the botanical relationship which places them in the same category with the club mosses and cattails of the marshes, is not readily suspected.

The true position of the "gymnosperms" or naked seeded plants, was recognized by Jussieu a generation before the investigators of the modern conifers came to an agreement in this respect relative to the proper classification of the pines.

There is no ovary in the flower of a conifer, but the ovule lies naked upon the surface of a scale.

Stigmas are entirely wanting and fertilization depends upon the distribution of the pollen by the wind without the aid of insects. The pollen of the pine is very abundant and is shed about the second week in March in the Gulf Coast area. The fruit is a woody strobile called a cone which matures the second or third year after flowering. The seeds are usually in pairs attached at the



A View of Longleaf Pine Plantation. Planted Four Years Ago with One-Year-Old Longleaf Pine Seedlings. (Note Height Growth.)

base in shallow depressions on the surface of the scales.

These are features which immediately differentiate them from the higher classes of plants. Furthermore, the internal anatomy and cellular frame work are so distinctive as to relegate the pines, so far as structural organization is concerned, a long distance from their associates in the forest.

The wood of the conifers has a very simple foundation of short woody fibers called tracheids, with few medullary or pith rays, scarcely visible, and resin ducts or passages of irregular length surrounded by resin secreting cells. The walls of the wood fibers are dotted or pitted and under the microscope look like a series of holes.

The sap of the tree is conducted entirely through these tracheids which communicate one with another by means of the pits as there are no ducts present such as are found in the wood of other trees.

These "bordered pits" are the distinctive features of conifer woods all of which have such a close similarity of structure as to make it difficult to tell the various species apart under magnification.

In the field, it is easy enough to recognize the species by their botanical characters.

The new wood is produced just under the bark, as the pines are exogenic in habit of growth.

The pine tree grows also in a peculiar and distinctive manner. The branches are produced in an imperfect whorl around the central trunk each year. In the forest these branches die, so that the trunk rises as a smooth and round shaft to a hundred or more feet.

The conifers furnish a typical instance of the retention of ancestral adult characters by the seedling, in that the needle leaves on the young shoots are replaced by scale leaves with age.

The scale leaves of the pines, as well as the deciduous habit of the cypress, larch and ginkgo, constitute inherited attributes from early types of ancestors of these trees.

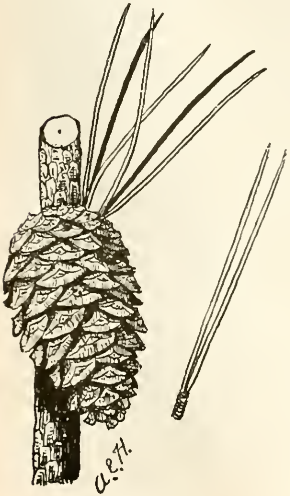
Seven different modifications of leaves, all more or less specific in character, are recognized by botanists during various stages of growth of the pines.

Owing to the shedding of the older leaves at the end of the second year and to the short annual growth of the axis, the leaves on the older trees are conspicuously crowded into dense tufts or tassels on the tips of the branchlets.

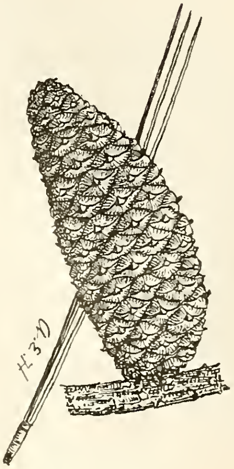
The high development of the organs of transpiration, as shown by the immense number of breathing cells, clearly indicates that forests of the pine, and in fact of most evergreens, are not less important than forests of deciduous trees in influencing atmospheric conditions, particularly when it is considered that in the former, clothed with perpetual foliage, this function suffers but little interruption of its activity.

The chromatin element, now the recognized physical basis of inheritance and development, carries the ideal form of the individual through subdivision into the germ cells, and represents the primary or original living unit.

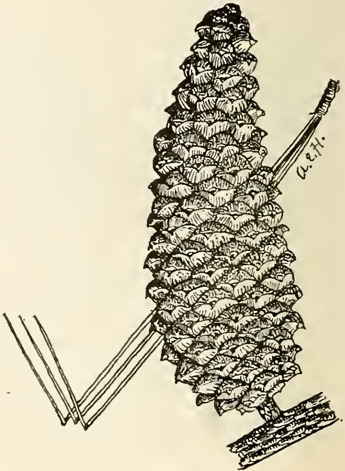
A definite progression and more perfect specialization is indicated from even the earliest geological periods in the course of development of the plant world up to its present state, and in almost



SHORTLEAF PINE
(Pinus echinata Mill.) (Pine Family.)



LOBLOLLY PINE
(Pinus taeda L.) (Pine Family).



LONGLEAF PINE
(Pinus palustris Mill.) (Pine Family.)

every class of plant life the number of fossil forms considerably exceeds the recent or living ones.

No adequate explanation for the causes underlying the extinction of former species or families has yet been found.

It may be that changes in external conditions with regard to the distribution of land and water, climate, salinity of water, volcanic eruption, natural enemies, or diseases may have led to the extinction of certain forms, but such theories fail to account for the disappearance of entire species or groups of plants.

The idea that cataclysmic changes ocurred on the earth at some period of its long history, has at the present day been pretty well discounted, inasmuch as the late investigations have demonstrated conclusively that enormous periods of time were required to bring about the various stages of the earth's development, and that the same forces and laws regulating the world today, have operated likewise in primeval times. More than likely the intervening records were lost. Although fossil remains of ancient life forms yield but a fragmentary record of themselves, are almost never perfectly perserved, and are usually more or less altered in appearance, yet, on the whole, they fit readily into place in the great framework of botanical classification.

A Giant Loblolly in a Virgin Stand in Louisiana

Botanists take delight in dwelling on the audacity of the geologists in determining species from leaf impressions. That some uncertainty exists in such identifications based upon fragmentary material perhaps may be granted; it has, however, been definitely shown that foliage characters in general are more fixed than those of almost any other organ of plants, and leaves are much less subjected to complex environmental factors.

Impressions of plants in the rocks constitute the bulk of the objects with which the paleobotanist has to deal.

The substance of the plant may remain as a carbonaceous film on clay or sandy sediment, or it may be replaced by iron oxide or other mineral, or the substance may be entirely dissipated leaving only the impression intact.

Coal or lignite beds are simply examples of the inclusion of vegetable debris as a mass.

Occasionally fossilized remains retain their internal structure intact and may be sectioned and studied under the microscope.

The earliest chapter from the fossil records inevitably begins with a series of more or less speculative conclusions derived from such fragmentary evidence, just as the written history of the human race is preceded by the shadowy findings of archaeology.

So far as we are able to interpret these records of the rocks, it appears that seaweeds or algae were the earliest plants of the earth, probably preceding the primitive animal life.

The first evidence of land plants occurs about the latter half of the Age of Fishes, or the Devonian, as it is called.

But it is quite likely that the low lying lands of the continents were clothed with a green herbage even from the beginning of the Age of Invertebrates.

As geological time progressed the land plants became more prolific, individuals grew to greater dimensions and greater heights and hence lived to a greater age.

In the upper Devonian strata there were found petrified trunks of trees whose structure bears a close resemblance to present day pines or conifers in cell structure and are readily recognizable as such.

Ferns, conifers and cycads flourished in the Coal Age following, and "Cordaites," as certain conifers are called, were dominant gymnosperms or naked seeded plants of the Paleozoic era.

Casts of such logs and fossils of the long strap-shaped leaves are plentifully found in the sandstones and shales of this age.

The woody trunks of these trees, while quite similar to those of modern pines, differed from them in having a central pith present.

Cordaites did not produce seeds in cones and the leaves were not needle-shaped, but had a family likeness to the ginkgo or maiden-hair tree which appeared about this time on the earth.

Cone bearing evergreens developed during the Coal Age and the "Coniferales," as this order became known, embraced the families of araucaria, sequoia, cypress, cedar, spruce, pine and others from which the parent trees of the present day species evolved.

All of the known conifers, either ancient or modern, were woody plants or trees with secondary growth tissues. No herbaceous forms are known.

The wide spread uniformity of physical conditions prevailing on the earth, such as equability of climate and abundant rainfall, continuing over a long period of time, conspired to make the carboniferous forests appear strange and wonderful. Two thousand or more species of plants made up these forests and have been identified from the fossil remains in the rocks above and below the coal deposits.

The Triassic Conifers, which came after the Coal Age plants, in a certain degree represented all the persistent orders and families.

Deposits of this age, consisting of wood, twigs, and single-seeded cone scales, closely resemble those of the present day species.

Logs of this age make up the fossil remains found in the Petrified Forest of Arizona and in the form of beautifully agatized trunks of large dimensions, ancestors of the present day araucarias.

The Jurassic period, sometimes referred to as the "Age of Gymnosperms" or naked seeded plants represented by the pines, seems to have been especially favorable for their development and distribution over the earth.

These queer conifers were abundant, also, all through the Mesozoic era when giant reptiles were swarming over the earth. They, with low resistance to cold, were adapted to a mild climate.

They had nothing like the rigid tenacity of life of the present day pines and firs that clothe the sides of the snow-capped peaks of Northern mountains under the extreme hardships of cold and high winds.

The Ginkgos or "Maidenhair trees" of many varieties, were among the very first of these primitive conifers. They were both abundant and widespread. At the present day their range is very restricted to parts of China and Japan. The ginkgo is allied to the Yew tree, with male and female flowers growing on separate trees. The leaves are fan-shaped and have a resemblance to the maidenhair fern but are considerably larger. The seed is covered with a fleshy coat and is resinous and astringent. When roasted the seed becomes edible and is much relished by Chinese.

The Sequoias or "big trees" appeared before the close of the Jurassic period and were very generally distributed over the United States and still persist in California. By well nigh universal consent the "big tree" is regarded as the most remarkable member of the earth's silva. Its enormous bulk, its restricted habitat, its precarious foothold in the northern part of its range and its plain relationship to the flora of the ancient world, combine to give this species a unique interest among all existing trees of the earth. The trunk truly simulates a Grecian column, in that the crown in the adult tree is small, rounded and with branches remarkable for their shortness and thickness.

In diameter the trunks average 10 to 20 feet and in height, 125 to 250 feet. The age of the adult trees varies from 500 years to over 3000 years in individual specimens. Nearly all of the big trees have been struck by lightning at some period of their growth but have survived the shock.

The Araucarias were widely distributed and abundant in the Mesozoic era and were found from New Jersey and North Dakota, south to Patagonia. At the present time they are confined to very restricted areas in Chile, Brazil, Australia and a few Pacific Islands.

They have the appearance of large palms with the limbs confined to a crown carried on a straight, columnar trunk.

This is the Monkey Puzzle tree of the florists.

The feature which puzzled the monkey was not the close arrangement of the limbs, but the stiff spiny character of the foliage tipping upward. The monkey could climb up to the top of the tree without pricking itself, but descending against such an array of needle points was indeed a puzzle.

The deciduous or bald cypress, common to our Louisiana swamps, is somewhat doubtfully represented by the Leptostrobus of the Jurassic period.

Cypress is consequently less ancient than Sequoia but became equally well distributed over the earth in this and subsequent periods.

The maximum range and development of these handsome trees appears to have taken place during the middle Eocene. They flourished abundantly in the Arctic regions especially in Alaska, Greenland, and in Spitzbergen during tertiary time, due, no doubt, to an extension of tropical conditions over a large area of the northern hemisphere.

Yet strange and unaccountable as it may seem, during this time Cypress was almost non-existent in the region occupied by Louisiana.

It is also authoritatively stated that no positive identification of fossil Eocene cypress has been made from plant remains found here, but extensively present in Tennessee and in more northern localities of this age.

With the coming of the Ice Age when the Northern continents became covered with an accumulation of ice a thousand or more feet thick, cypress was exterminated over the greater part of its former range.

At the close of the Ice Age which lasted about 300,000 years, Cypress seems to have been able to retain but a precarious foothold and, at the present time, it survives in only a very small area along the Gulf Coast and in Mexico and *nowhere else on earth.*

It is a singular fact that cypress was never found as a forest tree in South America.

The present structure, habits and ranges of the deciduous cypress are the result of ages of adjustment to the constantly changing environmental forces.

The extinct species of Taxodiaceae greatly outnumber the existing genera and species, only 13 now surviving.

That the family seems destined for extinction in the not far distant future, computed in geologic time periods, there is every reason to believe.

Fossil swamp strata, once cypress bogs, have been uncovered by artificial excavation or by natural erosion of Pleistocene sediments in a number of instances.

In 1777, Bartram discovered a buried forest of cypress and pine, which was investigated by Dr. Carpenter in 1838. This deposit was exposed to view on the side of the bluff at Port Hudson, La., 165 miles North of New Orleans. The buried forest was visited also by the celebrated Sir Charles Lyell in 1846, who published an account of his observations.

"At the bottom of the bluff," he says, "about the level of low water in the Mississippi river, a bed of vegetable debris was exposed. Cypress logs and other trees peculiar to the swamps were lying horizontally and interspersed with thin layers of clay. Besides these were numbers of erect stumps of cypress with roots reaching deep into the clay beneath. This buried forest was covered by a bed of clay 12 feet thick and followed by another superimposed bed of vegetable matter 4 feet thick containing logs and branches half turned into lignite. Among the logs was recognizable a pine tree with bark intact and cones present.

"This upper stratum points to the former existence on this spot of a forest in which cypress was absent.

"Above the upper layer of erect stumps are various beds of clay in all more than 50 feet thick with 2 thin layers of vegetable debris intercalated, and above the whole, about 20 feet of sand the lower layers of which included flinty pebbles and gravel.

"That the lowest bed had originally been a real cypress swamp was proven by the presence of peculiar knobs or excresences called Cypress Knees which the trees develop when growing in submerged soil and supply the roots with air.

"Subsequent elevation succeeded subsidence and in modern days the river is engaged in cutting away this fragment of Pleistocene history and very little is now visible."

Successive levels of cypress stumps with roots and knees imbedded in the muddy peat were discovered in recent years, all in a well preserved state, on excavating for the foundation of a large office building in New Orleans. Other remains of cypress trees which have been exterminated by natural causes are found to make up some of the elements of peat formations in certain South Atlantic states.

Cypress wood, it is said, contains phenolic compounds and geranyl alcohol and esters, which seem to be distasteful to termites and to act as preservative agents. It has received the trade name "The Wood Eternal" because of its slowness to decay, especially in wet soil.

Modern history records the existence of a great raft on the Red river some distance from Shreveport which impeded navigation. This raft mostly made up of pines, was removed by the state of Louisiana in 1835. It was composed of a mass of fallen timber ten miles long, 700 feet wide and 8 feet thick, accumulated naturally during 50 years or more. It was grown over with vegetation and even with trees as much as 60 feet high, and furnished a recent example of conditions suitable to coal or peat formation in geological times.

The pines appeared in the form of "Abietites" supposedly the ancestor of the existing family, towards the end of the lower Cretaceous period. The record, however, is questionable and many uncertainties exist as to the original stock.

However, it is certain that undoubted species of Pinus are known to have existed before the close of the Mesozoic era.

From covering a wide territorial range in earlier geologic times, the conifers became greatly reduced in species and numbers at the beginning of the tertiary or the age of Mammals.

The soil conditions, rainfall and humidity, all were favorable to their extensive development, but strange to say certain adverse conditions prevailed which effectually prevented their spreading in the Mississippi Valley.

The only explanation that the geologist can give to account for this singular fact is that the climate must have been excessively hot.

For the greater part of geologic time, uniformity, in the matter of climate, has been the rule rather than the exception. The present climatic zones of the earth are considered to be a mild counterpart of the Ice Age, conditions still quite rigorous in comparison with climates of former ages.

The laws of natural development and decay are in operation today just as they were ages ago, only we cannot see in a single lifetime or in several, results commensurate with the changes which centuries of effort bring about.

When it is recalled that nearly all the types of trees which make up the extensive lignite deposits of our section became entirely extinct, and that this area is tenanted today by an entirely new set of plants, some idea of the radical and mighty changes in the floral history which took place in Louisiana in Eocene time shapes itself upon one's imagination.

That some species of conifers abounded in the Wilcox eocene in the Mississippi Valley is indicated by the occurrence of canneloid lignite found in some Arkansas deposits.

This coal is largely made up of resin concentrated by the decay of pinewood together with pollen grains of conifers. It is also an established fact that the finds of amber usually associated with lignite, have their origin in the resinous exudate of extinct coniferous trees.

Pliny states that "amber is an exudation from trees of the pine family like gum from the cherry tree" and hence its Latin name "succinum" or gumstone.

A number of finds of this fossil resin are reported from Arkansas lignite strata, occurring in small detached masses.

Amber sometimes contains well preserved insects and flowers which lived a hundred million years ago. It also may be interesting to know in this connection that the Greek name for amber, which is "Elektron" is the term from which electricity derives its name due to the remarkable property of amber becoming negatively charged with electricity by friction.

The pines fail to compete successfully in nature, except under rigid or special conditions of life, with their angiosperm or more modern competitors. They are greatly handicapped in the race of life because of their inability to reproduce themselves with the vigor of other trees.

As soon as a pine tree is cut down the root dies and there is no power to send forth shoots from the stump for new growth.

Pine seed is light and its vitality is fleeting. "Mother nature matures a million pine seeds for each one she permits to grow up."

The pine tree is steadily driven backward by the nut bearing trees, especially by the oaks. As Darwin so significantly stated "the oaks have driven the pines to the sands."

The natural pine forests of the present day may be well defined as being "areas of preservation" and not as being "centres of distribution" of the species.

There are nine genera and over a hundred existing species of the Abietinaceae in the world today, confined to the north temperate zone. The extinct species are perhaps much more numerous.

The extinction of less well adapted organisms is attributed to the struggle for existence. At times extinction may have been caused by old age of the species, when reproductive functions have declined and decrepitude has set in.

Pines endeavor to fulfil the highest and noblest existence which the limitations placed upon them by heredity permit. Their elements in addition, are more or less plastic in their reactions to the infinite complexity of their surroundings. They patiently endure the cold and snow and death—

(Continued on Page 38)

New Orleans—Conservation Center of the Southland

Radio Address Delivered Over WWL September 5th, 1933 by the Secretary, of the Louisiana Department of Conservation, Under the Auspices of the New Orleans Young Men's Business Club.

IT is gratifying indeed to respond to Dr. Schoeny's invitation and to meet a request of that virile and enterprising organization, the Young Men's Business Club, to participate in their weekly radio program.

The Louisiana Department of Conservation, through its able business Commissioner, Colonel Robert S. Maestri, welcomes the opportunity to say a word at this time on the subject announced, "New Orleans—the Conservation Center of the Southland." Commissioner Maestri recalls with repeated interest the introductory remarks of Superintendent T. H. Harris, of the State Department of Education in his able address on the occasion of our last Conservation Week program:

"Nature is very partial in the bestowal of her gifts. One woman is beautiful, another homely; and one man is good, another bad; one is brilliant and intellectual, another foolish. However, I suppose there may be other traits that balance the account—somewhat.

"Now, when nature came to distribute her natural gifts to Louisiana, she seems to have been especially partial. It appears she was so pleased with Louisiana that she stopped and left most of her gifts in abundance."

JAMES P. GUILLOT

To substantiate the statement of this gentleman, so well known for his long years of experience and service to both State and Nation in the interest of education and conservation, we turn to the sources of history. We find Louisiana a land with an unbroken two century tradition of the use and enjoyment of natural resources as to food, clothing, and housing. Game fish, the staff of the Aborigines and early pioneer settler, and furs made New Orleans the great trading post of the Western Hemisphere for France, Spain, and England. New Orleans, traditional center for the study of wild life, was a city from which first came to science specimens of many of our most important fishes, birds, and fur bearers.

Louisiana, by grace of geographical position, and of present abundance of forest products, minerals and wild life, is a region of unique importance in the conservation pattern of the entire country. New Orleans, preeminently a city of a twelve month outdoor life, where it has become the general custom to enjoy the benefits of the woods and of the waters all year round: New Orleans, located near the coast in the richest wild life state, is of natural, logical, and peculiar importance in the conservation program, not only of the south, but of the entire nation, since through it pass, or in it there remain, during the winter, so vast a part of the migratory bird life of the entire continent.

New Orleans sportsmen and civic organizations should assume the leadership in cultivating favorable public opinion so indispensable to successful conservation administration.

Eighty-five per cent of the migratory game birds of North America are harbored in Louisiana's great game preserves—Marsh Island, Rockefeller Foundation, and the State Wild Life Refuge—where not a single shot has been fired for many, many years. This winter-haven abounds with all species of wild duck and geese where they are fed and protected during the entire winter, returning to their breeding quarters in the North each Spring.

The Department of Conservation has sunk on these sanctuaries a dozen deep water wells to supply fresh water for the wild life. It has also erected comfortable keepers' houses on the

A Cypress-Lined and Moss-Hung Louisiana Bayou, Haunt of Many Valuable Fur Animals, Near New Orleans

property in order that the keeper may remain there with his family and be constantly on the job. Some five or six hundred bags of rice and cracked corn are fed when food begins to diminish.

Louisiana wild game refuges are the largest in the world and were the first established and owned by any state or national government.

Under the direction of the present Commissioner, these sanctuaries have been brought up to a standard never before equalled in supervision, protection, and control.

Recently observation towers have been erected so that game wardens, by the aid of field glasses, may view the entire area of each refuge; lakes have been connected up by canals, thereby facilitating the patrolling and protecting of intervening areas; boat equipment has been increased, signs, large and small, posted at close intervals warning trespassers; and duck food has been planted in large quantities, thereby assuring a happy home for our winter visitors—the migratory bird life of North America.

The Department of Conservation's Gasoline Boat "Pelican" on an Inspection Tour of the Barataria Section.

The physical characteristics of Louisiana, and especially of the environments of New Orleans, provide the remarkable picture of a modern and busy city at whose very doors lie areas of country that display a completely primeval aspect, unchanged by hand of man. Thus, within the official city limits of New Orleans are to be found areas where excellent game fishing may be pursued and even the spectacular tarpon caught. "Every year, and during the last few days of August, a number of ardent sportsmen head for the waters of Barataria Pass, where annually the Grand Isle Tarpon Rodeo is held. Here at this picturesque spot the waters of Barataria Bay meet those of the Gulf of Mexico. On one side stretches romantic Grand Isle, and on the opposite side lies Grand Terre, site of old crumbling Fort Livingston where once Lafitte's home stood. Over these waters in past times this famous pirate plied his nefarious trade. Here for three days each year Louisiana's most expert Tarpon fishermen match their strength and cunning with that of this mighty monarch of sport fishes. Most of these men hail from the vicinity of New Orleans, or at least from southern Louisiana, but each year a number of men from distant parts of the United States also participate in one way or another. In 1932, for instance, John Held, Jr., the famous New York artist, was present."*

New Orleans is a critical conservation center for the Southland, in that here at the Department's headquarters must be solved many of conservation's most important problems of preserving for posterity, the game, fish, forests, and minerals. That so much still remains has been due to the peculiar natural history of Louisiana and particularly to efforts of conservationists and civic leaders such as this galaxy of enterprising young men, our sponsors, who compose the Young Men's Business Club—together with the character of Louisiana settlement, and of its people who appreciate the value and necessity of conservation.

The contributing factors, however, are of no assurance for the future and the safety of our natural resources must depend alone upon the wisdom of their present and their future exploitation and rehabilitation.

To this end the officials of the Department of Conservation rely primarily upon such men as those who requested us to speak this evening. Louisiana and New Orleans are charter members of our nation's conservation club, and, lest we forget, may we briefly review a page that may inspire continued progress.

IVORY-BILLED WOODPECKER
Living Specimens of this Rare Bird are Found in Louisiana

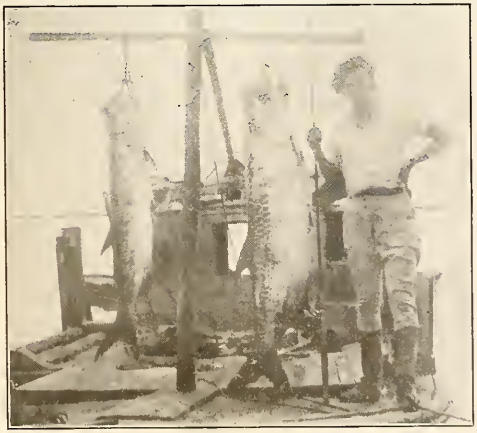
When the Louisiana Legislature in its wisdom created the Department of Conservation, the question of domicile was given due consideration. Aside from New Orleans being, by reason of historical tradition and geographical position, the most ideal and practical for this Department's domicile, the consideration of the vast industries of fisheries, oyster and water bottoms, fur and wild life, forestry, and recently minerals, all in close proximity to this city left no other choice than the city of New Orleans. In further explanation may I enumerate some of the reasons why the legislature so decided:

Fisheries

We note that a majority of wholesale fish dealers are located in and near New Orleans, where the bulk of sea foods are delivered for reshipment in both interstate and intrastate commerce.

There are employed in the catching of sea foods in and around New Orleans between four (4,000) and five (5,000) thousand fishermen and there are always questions coming up in regard to the methods and conditions of handling these sea foods,—questions that must be settled immediately and would be delayed and cause great inconvenience if the office were located at any other point in the state.

There are also a vast number of fishermen using trawls and seines, coming to this office to receive instructions regarding conservation laws and payment of taxes and licenses due the state. As a majority of these fishermen live in neighboring parishes to Orleans, it would be inconvenient for them to go elsewhere, and personal contact is essential and



Tarpon Caught in the Calcasieu River at Twin Reefs, Two Miles North of Cameron, in September, 1931, By Parties from Memphis and Shreveport necessary to the proper functioning of the fisheries division.

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*"Tarpon Rodeos in Louisiana," La. Conservation Review, July, 1933.

There are sixty wholesale fish dealers in New Orleans and about 2,500 retail fish dealers; about 2,000 boats are licensed to trawl and freight, and their ports are in and around New Orleans. There are also thirty sea-food canneries and many drying platforms located nearer to New Orleans than any other point in Louisiana.

If the Department of Conservation were located anywhere else, fisheries activities in countless routine matters pertaining to this division now handled through New Orleans would be handicapped and would entail greater expense.

Forest Products

The Division of Forestry cooperates to a great extent with the United States Forest Service, from which it receives funds amounting to $40,000.00 annually. This cooperation necessitates daily contacts. The United States Forest Service has its Southern Forest Experiment Station and its Federal District Forester's offices in New Orleans.

Removing the Incomparable Louisiana Oyster from a Natural Reef by Hand Tongs

The lumber industries not only of Louisiana, but of the Southern states, hold their conventions and office contacts in the city of New Orleans. The Department's Division of Forestry has been materially aided by the constant contact with the lumber industry through the association's headquarters kept permanently in the city, as well as through various annual meetings held in this city.

New Orleans, being a banking center, where headquarters and sale agencies are maintained, has facilitated the financing of many large lumber industries.

Fur and Wild Life

There are 15,000 trappers in Louisiana marshes surrounding New Orleans, many of whom have daily contacts with agents of the Department.

One thousand fur buyers buy furs in Louisiana marshes and it is necessary that they carry large sums of cash with them, secured from the fur dealers located in New Orleans. They have frequent routine transactions with the Department.

There are some sixty-five fur dealers whose records and activities are in close touch with this office. The entire fur industry, centered in New Orleans, requires ample funds supplied by New Orleans banks.

The fur market headquarters are in New Orleans.

There are seven millon acres of marsh land within the proximity of New Orleans, connected by hundreds of lakes and water ways where fisheries, game, oyster beds, and fur-trapping lands are protected and patrolled by this Department.

There are 100,000 hunters in Louisiana, 60,000 of which hunt migratory game birds in the marshes of Louisiana in the proximity of New Orleans.

There are thirty-five licensed hunting clubs in the proximity of New Orleans which must be supervised and checked.

Mines and Minerals

Actual exploitation and great potential development of both oil and sulphur exist within close proximity, in the parishes of Terrebonne, Plaquemine, St. Bernard, Lafourche, St. Martin, Iberia, St. Mary, Assumption, and St. Tammany; with the largest active sulphur field in the world, and three producing salt mines in Iberia Parish.

From an industrial viewpoint, this combination of salt and sulphur deposits must eventually become the center of extensive chemical developments. Labor for these industries can be secured easily in New Orleans.

Oyster and Water Bottoms

This division must keep records of approximately 8,000 oyster bedding leases which are referred to daily and must be kept close at hand.

All the bedding grounds are located within sixty miles of the city of New Orleans.

A large per cent of the oystermen of Louisiana require personal contact with the department to properly conduct their business and to secure applications for leases, payment of rentals and fees, settling controversies as to the different questions of boundaries, etc., with the department.

An even larger percentage of oystermen than the above-mentioned are poor and would be unable to make a trip to a point other than New Orleans every time they wish to obtain instructions or service from this department.

Every application for a bedding ground lease entails a survey by the Director of the oyster division and as a consequence he spends seventy-five per cent of his time in the field with or among the oystermen. By removing his ofifce from New Orleans, unnecessary expense and a great loss of time would prevent its proper functioning.

The oyster beds in Louisiana are located solely along the coast of South Louisiana. These beds are centrally located from New Orleans and are remote from any other industrial center in the state. The location in New Orleans affords an opportunity for the department to have constant supervision and control over the oyster beds of this state.

The oyster division's administration vessel is kept in Harvey's Canal, across the river from New Orleans, from which point the bedding grounds and locations can be easily reached.

Vast quantities of sand and shells are located in the vicinity of New Orleans, where constant contact and supervision is necessary.

ENFORCEMENT, EDUCATION AND RESEARCH

Together with the above activities, education, enforcement, and research play their own important part in conservation work. With their respective offices or bureaus in New Orleans, every town and village and ramification of the state is reached through these effective agencies. Since enforcement is absolutely essential on matters pertaining to conservation, it is imperative that the enforcement officer should be in close touch and contact with the hunting and fishing grounds in and around New Orleans, as the majority of fishing seining, trawling, oyster fishing, trapping, duck hunting, collection of licenses, and general supervision of the fur, wild life, oyster, fish, shrimp, sand and shells divisions, as well as the supervision of our enforcement fleet, consisting of approximately twenty-two boats, operate out of New Orleans.

CONCLUSION

One of the guiding principles upon which the policies of the department are based is:

"He who severs and profits by the exhaustion of the natural resources of the state, in the creation of which he had no hand, should, in addition to the common burden of the expense of government, borne by all alike, bear an additional burden of taxation, the proceeds to go toward replacing either the resource which he had removed, or, if that be impossible, toward renewing one which by its nature is renewable."

New Orleans and Louisiana, pioneers in the cause of Conservation—having been the recipient of "Nature's gifts in abundance," the nation's most interesting city and our good old state of Louisiana, mother of the many states carved out of the territory of St. Louis, adhere to the prevailing injunction of President Franklin D. Roosevelt—"Ours is a work of restoration. The Nation's first asset is to be found in the life of the people, which life is bound up and completely dependent on nature's material wealth, reaching every hamlet in this great republic."

Consistent with this present day doctrine and practice how applicable are the words of the late tribune of the people, the great Commoner, William Jennings Bryan: "There is no twilight zone between the nation and the state, in which exploiting interests can take refuge from both—and my observation is that most—not all, but most—of the contentions over line between Nation and State are traceable to predatory corporations which are trying to shield themselves from deserved punishment or endeavoring to prevent needed restraining legislation. The first point which I desire to make is that earnest men with an unselfish purpose and concerned only with the public good, will be able to agree upon legislation which will not only preserve for the future the inheritance which we have received from a bountiful Providence, but to preserve it in such a way as to avoid the dangers of centralization."†

The translation of these words into action is a task in which we ask the Young Men's Business Club to co-operate. I thank you.

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†Address before Conference of Governors, Washington, D. C., 1908.

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Conservation Alone Can Prevent "Last Post" for Wild Life

By
JAMES NELSON GOWANLOCH
Chief Biologist, Bureau of Research
Department of Conservation

THE conservation of natural resources is a problem that touches the life of every citizen of the United States and not, as so often believed, merely a matter that concerns only the hunter, the fisherman or the forester. Directly or indirectly it is important to every man, woman and child in the land that the natural wealth and natural beauty we have inherited be preserved so that using these gifts advantageously ourselves we may still properly convey them unimpaired to posterity.

It is impossible to paint an adequate picture of the appalling destruction of wild life that has occurred on the continent of North America due to influence of man. Some of this destruction has been undoubtedly inevitable, but not all, for it is quite possible by proper conservation policies to arrest the otherwise fatal flood of annihilation that flows over wild life and other natural resources in the presence of a nation that, constantly increasing in population, is likewise steadily expanding in the measure of its industrial development.

Louisiana has an especial claim upon the court of American attention in its importance as a logical place for most effective conservation. Louisiana, of all states, has by grace of geographical position, history, present condition and peculiarly rich wild life, probably no peer among all the other 47 states. Yet if we examine the record of even the last century we gain some emphatic and startling impression of the way that here as otherwhere wild life has gone down before the destructive activities of man.

Let us examine certain specific instances of this appalling ebb in wild life resources.

John James Audubon (1785-1851), that most famous of all North American ornithologists, who spent some of the most fruitful years of his full life in Louisiana, thus vividly describes both the abundance and the amazing slaughter of American Golden Plover at New Orleans, Louisiana, 112 years ago:

"While at New Orleans on the 16th of March, 1821, I was invited by some French gunners to accompany them to the neighborhood of Lake St. John to witness the passage of thousands of these birds, which were coming from the northeast and continuing their course. At the first appearance of the birds early in the morning, the gunners had assembled in parties of from 20 to 50 at different places, where they knew from experience that the plovers would pass. There stationed, at nearly equal distances from each other, they were sitting on the ground. When a flock approached, every individual whistled in imitation of the plover's call note, on which the birds descended, wheeled, and, passing within 40 or 50 yards, ran the gauntlet, as it were. Every gun went off in succession, and with such effect that I several times saw a flock of a hundred or more reduced to a miserable remnant of five or six individuals. The game was brought up after each volley by the dogs, while their masters were charging their pieces anew. This sport was continued all day, and at sunset, when I left one of these lines of gunners, they seemed as intent on killing more as they were when I arrived. A man near the place where I was seated had killed 63 dozens. I calculated the number in the field at 200, and supposing each to have shot 20 dozen, 48,000 golden plovers would have fallen that day."

The end of the last century found this most beautiful of all our shore birds at its lowest ebb. Throughout the country big flights could no longer be found, and indeed, in many places where it was formerly abundant not a single individual remained. Only complete legislative protection of this distinguished species saved it from destruction so that it is today possible to see more than merely a stiff stuffed American Golden Plover in some dim museum case. Under complete protection the species has now shown definite signs of general recovery.

Not always, however, has the stable door been shut quickly enough in problems of wild life protection. Two other examples, both of them it happens also birds, will well serve to illustrate this point. These are the Eskimo Curlew and the Passenger Pigeon.

The Eskimo Curlew is another very distinctive shore bird. Almost fifteen inches long and striking in appearance because of its long down-curved bill, the Eskimo Curlew was once an abundant and much prized game bird. Like the Golden Plover, this species performs a course of annual migration whereby leaving the eastern coast of North America in autumn after a period of abundant feeding, it strikes overseas in a probably uninterrupted flight 2,000 miles to South America and thence southward to Patagonia. Returning in the spring it follows a different course, tracing a pathway northward up the Mississippi Valley to its breeding grounds in arctic barren lands. Thus, like that of the American Golden Plover, its annual travels form an immense and irregular loop.

The Eskimo Curlew was once familiar, distinguished and numerous in Louisiana. Writing as briefly ago as 1900, Professor Geo. E. Beyer stated of the Eskimo Curlew in this state that it was "very common for a short while in fall and spring." If we trace the history of this species somewhat further back, we find that it occurred in almost incredible numbers and was subjected to a terrific spring slaughter by market hunters. Audubon, in 1840, writing of its presence in the Gulf of St. Lawrence where it was preparing to set out on its flight across the ocean stated that the Eskimo Curlew "evidently came from the north and arrived in such dense flocks as to remind me of the Passenger Pigeons. * * * * * The birds at length came, flock after flock, passed close round our vessel, and directed their course toward the sterile mountainous tracts in the neighborhood; and as soon as the sun's rays had dispersed the fogs that hung over the land, our whole party went off in search of them."

Describing the destruction of this bird while it was still abundant, Swenk thus writes: "Hunters would drive out and shoot the birds without mercy until they had literally slaughtered a wagonload of them, the wagons being actually filled, and often with the sideboards on at that. Sometimes when the flight was unusually heavy and the hunters were well supplied with ammunition their wagons were too quickly and easily filled, so whole loads of the birds would be dumped on the prairie, their bodies forming piles as large as a couple of tons of coal, where they would be allowed to rot while the hunters proceeded to refill their wagons with fresh victims, and thus further gratify their lust of killing. The compact flocks and tameness of the birds made this slaughter possible, and at each shot usually dozens of the birds would fall. In one specific instance a single shot from an old muzzle-loading shotgun into a flock of these curlews as they veered by the hunter brought down 28 birds at once, while for the next half mile every now and then a fatally wounded bird would drop to the ground dead. So dense were the flocks when the birds were turning in their flight that one could scarcely throw a brick or missile into it without striking a bird."

Today the Eskimo Curlew stands either on the verge of extinction or has already passed over that fatal border into the list of species forever lost. Thus, four years ago Bent wrote: "The story of the Eskimo Curlew is just one more pitiful tale of the slaughter of the innocents. It is a sad fact that the countless swarms of this fine bird and the passenger pigeon, which once swept across our land on migrations, are gone forever, sacrificed to the insatiable greed of man."

Best known of all North American tales of destroyed wild life is that of the Passenger Pigeon which, however, it will be well here to recall for, like the Eskimo Curlew, the Passenger Pigeon was once a bird familiar to every boy and every hunter in Louisiana. The Passenger Pigeon once bred from Central Canada southward to Kansas, Mississippi, Kentucky, Pennsylvania and New York and wintered chiefly from Arkansas to North Carolina south to Central Texas, Louisiana and Florida. No other bird has so evoked the astonishment of early travelers in North America as did this species with its almost unbelievable multitudes. Let us turn to the records of these earlier days.

Higginson, in 1630, thus describes the flocks of Passenger Pigeons near Salem, Mass.: "Upon the eighth of March from after it was faire Daylight until about eight of the clock in the forenoon, there flew over all the towns in our Plantacions soe many flockes of Doves, each flock contayning many thousands, and soe many that they obscured the light, that passeth credit, if but the Truth should be written."

Wood, in 1635, wrote: "These birds come into the Country to go to the North parts in the beginning of our Spring, at which time (if I may be counted worthy, to be beleeved in a thing that is not so strange as true) I have seen them fly as if the Ayerie regiment had been Pigeons, seeing neyther beginning nor ending, length, or breadth of these Millions of Millions. The shouting of people, the ratling of Gunnes, and pelting of small shotte could not drive them out of their course, but so they continued for foure or five houres together; yet it must not be concluded, that it is thus often; for it is but at the beginning of the Spring, and at Michaelmas (September 29), when they returne back to the Southward; yet are there some all the yeare long, which are easily attayned by such as looke after them."

Pehr Kalm, that observant early traveler, thus dramatically describes the overwhelming spectacle of a pigeon flight observed by him in 1740. "Their number, while in flight, extended 3 or 4 English miles in length and more than one such mile in breadth, and they flew so closely together that the sky and the sun were obscured by them, the daylight becoming sensibly diminished by their shadow.

"The big as well as the little trees in the woods, sometimes covering a distance of 7 English miles, became so filled with them that hardly a twig or branch could be seen which they did not cover; on the thicker branches they had piled themselves up one above another's backs quite about a yard high.

"When they alighted on the trees their weight was so heavy that not only big limbs and branches of the size of a man's thigh were broken straight off, but less firmly rooted trees broke down completely under the load."

Wilson, that distinguished early American ornithologist, gives the following account of flight which he observed from Frankfort, Ky., in 1852.

"Coming to an opening by the side of a creek called the Benson, where I had a more uninterrupted view, I was astonished at their appearance. They were flying with great steadiness and rapidity, at a height beyond gunshot, in several strata deep, and so close together, that could a shot have reached them, one discharge could not have failed of bringing down several individuals. From right to left as far as the eye could reach, the breadth of this vast procession extended, seeming everywhere equally crowded * * *. It was then half past one. I sat for more than an hour, but instead of diminution of this prodigious procession, it seemed rather to increase both in numbers and rapidity; and, anxious to reach Frankfort before night, I rose and went on. About four o'clock in the afternoon I crossed the Kentucky river, at the town of Frankfort, at which time the living torrent above my head seemed as numerous and as extensive as ever. Long after this I observed them, in large bodies that continued to pass for six or eight minutes, and these again were followed by other detached bodies, all moving in the same south-east direction, till after six in the evening."

Our own Audubon with his characteristic skill thus writes of the flocks returning from the feeding grounds to their roosts: "The noise which they made, though yet distant, reminded me of a hard gale at sea, passing through the rigging of a close-reefed vessel. As the birds arrived and passed over me, I felt a current of air that surprised me * * *. The pigeons, arriving by thousands, alighted everywhere, one above another, until solid masses were formed on the branches all round. Here and there the perches gave way under the weight with a crash, and, falling to the ground, destroyed hundreds of birds beneath, forcing down the dense group with which every stick was loaded."

Today, as far as is known, there is not a single living Passenger Pigeon in the whole world. Too late the slipping away of this exquisite wild bird into irrevocable extinction became apparent and rewards of more than a thousand dollars were offered (1910-11-12) for anyone who could discover a living wild Passenger Pigeon. The last wild Passenger Pigeon killed was taken in April, 1904. The last wild Passenger Pigeon positively identified in life was observed in 1907. The last living Passenger Pigeon in captivity died of old age in the Cincinnati Zoo in September, 1914. This bird had been bred in captivity by Professor C. O. Whitman, of the University of Chicago, in the course of some experiments in heridity which he had been conducting. Human cupidity destroyed this exquisite species for it is estimated that in 1879 no less than 5,000 people in the United States were engaged in netting Pigeons for the market. One trapper caught and delivered 2,000 dozen Pigeons in ten days, or about 2,500 birds a day. Another caught 1,332 birds in a single throw of the net while a third was known to have taken in one net during a single day 5,000 birds. Not alone were Passenger Pigeons hunted as adults, but the breeding grounds were invaded and the young torn from their nests providing such a scene as that described in 1879 by one eye witness. "Scarcely a tree could be seen but contained from 5 to 50 nests, according to its size and branches. Directed by the noise of chopping and of falling trees, we followed on, and soon came upon the scene of action. Here was a large force of Indians and boys at work, slashing down the timber and seizing the young birds as they fluttered from the nest. As soon as caught, the heads were jerked off from the tender bodies with the hand, and the dead birds tossed into heaps. Others knocked the young fledglings out of the nests with long poles." These beautiful birds were actually shipped by the hundreds of barrels to the Chicago stock yards to be fed to hogs.

The above three examples happen to concern birds and have been chosen simply to illustrate in an emphatic manner how great can be the effect of man upon wild life and other natural resources. It is of no personal concern to many of the readers of this Review that the American Golden Plover approached extinction, that the Eskimo Curlew is probably extinct or that the Passenger Pigeon has forever disappeared from the world of living things. It is, however, of deepest importance to everyone, whether realized or not, that unobserved by most of us the natural resources of the State whether bird life or forest life or other sort, are subject to grave dangers in the face of influences of man. Such wild life and other natural resources are not to be esti-

(Continued on Page 40)

Conservation of Louisiana's Mineral Resources, 1906 to 1918*

By CYRIL K. MORESI, M. S.
Geologist, Department of Conservation

A study of the policies and activities of the State and the Department of Conservation with regard to the mineral resources of Louisiana from 1918 to the present time will be presented in a later issue.

PART II

DISCOVERY AND DEVELOPMENT OF LOUISIANA'S MOST IMPORTANT MINERAL RESOURCES

A HISTORY of the conservation movement in Louisiana with respect to the mineral resources of the State would not be complete without mentioning some of the important discoveries and developments which took place about the beginning of the twentieth century.

The first commercial production of oil in Louisiana was obtained from the Jennings Oil Field in 1902. The peak of production for this field was reached in 1906, when the production for the year amounted to over nine million barrels.[16] At this time (1906) a number of other fields in the state were producing oil. The Caddo field was the first gas field in the State to attract attention. In 1905 a gas well blew out with terrific force, wasting millions of cubic feet of gas daily. Major Frank M. Kerr, later a member of the Louisiana Commission on Natural Resources, visited the field on behalf of the State to see what might be done to check the waste of gas and reported his results to the Governor. The daily waste of gas in the Caddo field during the latter part of the year 1908 was estimated at 70,000,000 cubic feet.[17] This waste in the production of oil and gas was in part responsible for the interest taken by the executives of the State in the national conservation movement as well as for State legislation leading to conservation. Developments in the oil and gas industries of the State have been so rapid and are so well known that further discussion of the development of these industries will not be attempted here.

Fortunately Louisiana's two most important mineral resources with the exception of oil and gas, that is, salt and sulphur, have needed little attention from the standpoint of conservation. However, these two substances are so important that a brief discussion of their discovery and development would not be out of place. Moreover, present indications suggest that the production of sulphur, especially, may become of even greater importance in the future.

Mountain of Sulphur Mined in Calcasieu Parish

During the early part of the nineteenth century, salt was obtained from salt springs on Avery Island, and it is believed that the existence of rock salt was also known to the Indians. Although many efforts to mine the salt were made during this century, it was not until 1899, when a new shaft was completed, that this mine became an important salt producer.[18] In 1902, the production of salt began at the Weeks Island salt mine.[19] These two salt mines and two others, Jefferson Island salt mine which began production[20] in 1923 and Winnfield salt mine which began producing salt during 1932, are in operation at the present time.

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*Continued from La. Conservation Review July, 1933.

[16] Barton, D. C., and Goodrich, R. H., *The Jennings Oil Field*, Bull. Am. Assoc. Pet. Geol., Vol. 10, p. 72.

[17] Harris, G. D., *Oil and Gas in Louisiana*, U. S. Geol. Surv., Bull. 429, pp. 136 ff.

[18] Howe, H. V., and Moresi, C. K., *Geology of Iberia Parish*, La. Dept. Consv., Geol. Bull. No. 1, pp. 131 ff.

[19] *Ibid.*, p. 170.

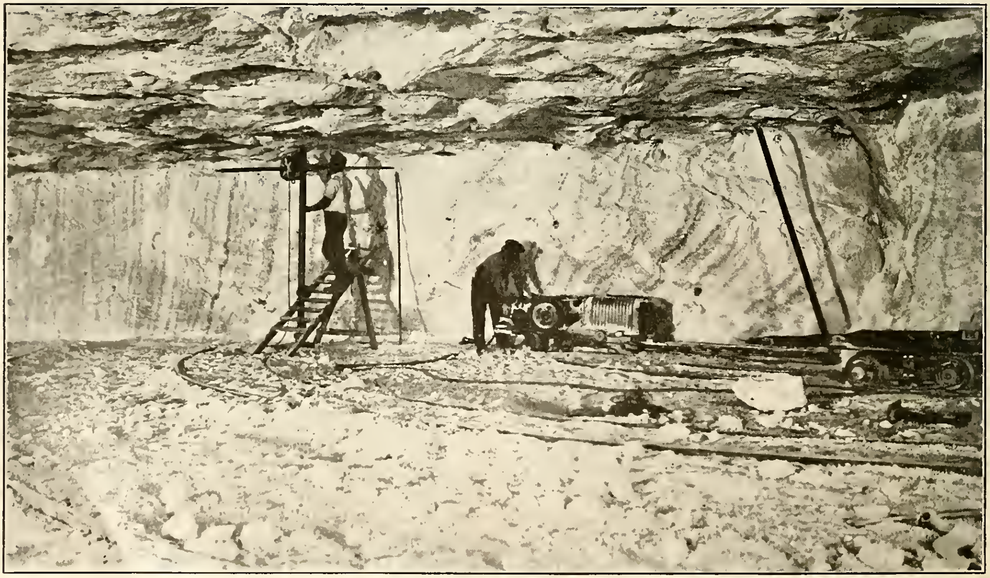
Although sulphur was discovered in a well drilled on the Sulphur Salt Dome in the latter part of the nineteenth century, it was not until 1903 that the property was placed on a commercially producing basis.[21] The sulphur from this dome was exhausted in 1924. From that date until 1932 no sulphur was produced in Louisiana. In October, 1932, the Jefferson Lake Oil Company began the commercial production of sulphur. During the last few months the Freeport Sulphur Company has been prospecting for sulphur on Lake Grand Ecaille or Lake Washington salt dome, Plaquemines Parish, and it is anticipated that this dome will soon be yielding sulphur in commercial quantities.

Conservation Movement in Louisiana[21a]

Because of the increasing need for conservation of the oil and gas of the State and because of the interest aroused by the Conference of Governors in Washington, the Louisiana Legislature in the summer of 1908 created a board of commissioners known as the "Commission on Natural Resources." Louisiana, however, had previously taken some steps towards conservation and therefore may be considered as one of the first states to do so. As early as 1906, the Legislature passed an act[22] for the purpose of protecting the natural gas fields of the State, because of the excessive waste of gas in the Caddo field. This act declared it unlawful to allow any gas to burn after due notice had been given. In case the owner did not close or cap the well the act declared that the "Governor shall order the board of State Engineers to take charge of such work."

The Commission established in 1908 was composed of seven members, two of which were ex-officio, the Professor of Horticulture of Louisiana State University, and the Chief Engineer of the State Board of Engineers; the other five were appointed by the Governor. This board selected a president and a secretary from its members. The Secretary received a salary of $900.00 a year and the act required that the total expenses of the Commission was not to exceed $2,500.00.[23]

The purpose in creating this commission was to investigate the natural resources of the State, including the prevention of waste in the extraction of oil, gas, and other minerals, and to co-operate with the several states and the National



Undercutting and Drilling in Preparation for Blasting Jefferson Island Salt Mine, Jefferson Island, Louisiana

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[20] *Ibid.*, p. 151.

[21] Kelly, P. K., *The Sulphur Salt Dome*, Bull. Am. Assoc. Pet. Geol., Vol. 9, 1925, p. 480.

[21a] As early as 1897, Judge J. B. Robertson presented a report to the Legislature in which he recommended the establishment of a Bureau of Arts, Agriculture, and Immigration. He suggested that among the duties of this Bureau should be the exploration, control, and supervision, of the mineral resources of the State. See "The Contribution of Louisiana State University to the Development of Louisiana Geology," *La. Conservation Review*, April, 1933, pp. 23 ff.

[22] *Acts* of La., No. 71, 1906, p. 112.

[23] *Acts* of La., No. 144, 1908, p. 201.

Conservation Commission in making this investigation. This Commission was to present to the General Assembly in 1910 the results of these investigations and to advise the necessary legislation for the conservation of the natural resources of the State. Although Newton C. Blanchard had been recently succeeded by Governor Jared Y. Sanders as Governor of Louisiana, he was instrumental in having this Commission established, and, as a member of the National Conservation Commission, greatly assisted the Louisiana Commission.

The investigations and recommendations of the National Conservation Commission were presented at the Conservation Conference held in Washington December, 1908. As a result of this conference the Louisiana Legislature in 1910 created a "Conservation Commission" of the State of Louisiana. The act[24] creating this Commission provided for its maintenance, administration, and duties. The Commission was composed of eight members, three of whom were ex-officio, the Superintendent of the State Experimental Stations, the State Forester, and the Chief Engineer of the State Board of Engineers; the other five were appointed by the Governor, who designated from among the members a chairman and a secretary. The Legislature appropriated a sum of $1,800.00 a year for the expenses of the Commission for the years of 1910 and 1911. Of this sum the secretary was to receive $900.00 a year, a stenographer $200.00, and the remainder to cover incidental expense. This Commission was established for the purpose of continuing the investigations of the natural resources and to supplement the report of the previous Commission. The report was to be presented at the Legislative Session of 1912.

The Department of Mining and Minerals, including oil and gas production, which was established in 1910, was placed under the supervision of this Commission.[25] The Department was composed of the Register of the State Land Office, Ex-Officio Supervisor of Minerals, and one Deputy Supervisor of Minerals, who was required to have a practical knowledge of geology and petroleum engineering. This Deputy Supervisor was appointed by the Governor on the recommendation of the Conservation Commission. He received a salary of $2,000.00 per year and $1,000.00 per year for office and travelling expenses which was paid from the Conservation fund. It was the duty of the Deputy Supervisor to enforce all laws and regulations pertaining to mining and minerals, to inspect mines, to enforce the license tax, and to make an annual report to the Conservation Commission on the wells drilled and the amount of oil and gas produced.

A conservation fund was created by levying, collecting, and enforcing payment of an annual license tax upon all persons, associations of persons, or business firms and corporations, pursuing the business of severing timber and minerals from the soil.[26] This act required that these companies make an annual report of their operations to the Secretary of State and that the local tax collectors collect the taxes when payable. Article 229 of the Louisiana Constitution was amended[27] so as to allow the State to levy this license tax on the severing of minerals and other natural resources from the soil.

During the Legislative Session of 1910 two bills were passed to compel owners to abandon wells properly and to prevent waste in the extraction and transportation of oil and gas. One of these acts[28] required the Supervisor of Minerals to prescribe regulations for the boring of oil and gas wells and to enforce these regulations. The other act[29] authorized the Governor or Constable or Justice of the Peace to direct the State Board of Engineers to cap or abandon a well properly at the expense of the owner. The enforcement provided for in these two acts appeared to have been duplicated, probably due to an unorganized and unplanned method of enacting laws to prevent waste of the natural resources of the State. Fred J. Grace, Register of the State Land Office and Commissioner of Mines and Minerals, in his report[30] to the Governor in 1912, stated that "Act No. 190 of 1910 has proven beneficial, it has prevented to a great extent the careless wasteful methods that were first prevalent."

The Conservation Commission of Louisiana was finally created at the regular session of the Legislature of the year 1912. The act[31] creating this Commission provided that "the said Commission shall have charge of all natural resources of the State, and specifically charges it with their preservation and upbuilding." This act defined the duties and powers of the Conservation Commission and constituted it as a department of the Government. Three commissioners were to be appointed by the Governor with the advice and consent of the Senate for a term of four years—subject to removal through jujdicial process. The Commission was vested with corporate powers and the Attorney General was required to represent the Commission. Sheriffs and Con-

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[24] *Acts* of La., No. 172, 1910, p. 255.

[25] *Acts* of La., No. 254, 1910, p. 423.

[26] *Acts* of La., No. 196, 1910, p. 329.

[27] *Acts* of La., No. 154, 1910, p. 234.

[28] *Acts* of La., No. 190, 1910, p. 313.

[29] *Acts* of La., No. 283, 1910, p. 484.

[30] *Biennial Report*, Register of State Land Office, 1912, p. 36.

[31] *Acts* of La., No. 127, 1912, p. 151.

1933 LOUISIANA 1934

FUR, GAME, AND FISH LAWS

■ BLACK SQUARES DENOTE CLOSE SEASONS □ WHITE SQUARES DENOTE OPEN SEASONS
NUMBERS IN SQUARES ARE OPEN DATES

MIGRATORY GAME BIRDS	JAN.	FEB	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP	OCT.	NOV.	DEC.	BAG AND POSSESSION LIMITS
WILD DUCKS Except Wood Duck	JAN. 15	■	■	■	■	■	■	■	■	■	NOV. 16	□	15 daily, 30 in possession at one time.
WILD GEESE	JAN. 15	■	■	■	■	■	■	■	■	■	NOV. 16	□	4 daily, 8 in possession at one time.†
COOT (POULE D'EAU)	JAN. 15	■	■	■	■	■	■	■	■	■	NOV. 16	□	25 daily, 300 season.
SNIPE	JAN. 15	■	■	■	■	■	■	■	■	■	NOV. 16	□	20 daily, 240 season.
DOVE	JAN. 31st	■	■	■	■	■	■	■	■	■	NOV. 20	□	25 daily, 300 season.
WOODCOCK	■	■	■	■	■	■	■	■	■	■	■	DEC. 1 TO 31ST.	6 daily, 22 season.
RAILS	JAN. 31ST.	■	■	■	■	■	■	■	■	■	NOV. 1ST	□	25 daily, 300 season.
GALLINULES	JAN. 31ST	■	■	■	■	■	■	■	■	■	NOV. 1ST	□	15 daily, 300 season.
SORA	JAN. 31ST.	■	■	■	■	■	■	■	■	■	NOV. 15	□	25 daily, 300 season.
RESIDENT GAME BIRDS													
BOB WHITE (Quail or Partridge)	□	FEB. 15	■	■	■	■	■	■	■	■	NOV. 15	□	15 daily, 120 season.
WILD TURKEY	■	■	■	■	■	■	■	■	■	■	■	■	Closed for 5 years.

GAME ANIMALS

DEER*		FEB.15	■	■	■	■	■	■	■	■	NOV.15		Bucks only. 1 daily, 5 season. Illegal to kill fawns or does.
	■	■	■	■	■	■	■	■	■	■	■	■	
BEAR		FEB.15	■	■	■	■	■	■	■	■	NOV.15		1 daily, 5 season.
SQUIRRELS		FEB.15	■	■	■	■	■	■	■	■	NOV.15		10 daily, 120 season.
RABBITS		FEB.15	■	■	■	■	■	■	■	■	NOV. 1ST		No limit, may be sold in open season.
FUR ANIMALS Muskrat, Mink, Opossum, Otter, Raccoon, Wolf, Fox, Skunk, Etc.		FEB LAST	■	■	■	■	■	■	■	■	■	DEC. 1ST	Trap limit 250, traps must be visited daily.

HUNTER'S LICENSE PROVISIONS

LICENSE YEAR JULY 1 TO JUNE 30

HUNTING LICENSES:

Residents, hunting license	$ 1.00
Non-residents, four consecutive days' hunting license	$ 5.00
Non-residents, hunting lincense	$15.00

TRAPPING LICENSE:

Residents only, does not allow hunting, good only in Parish where trapping is done	$2.00

FISHING LAWS

FRESH WATER GAME FISH

KIND	Size Limits	Creel Limits
BLACK BASS (green trout)	10 inches or more	20 daily
YELLOW BASS (striped bass)	7 inches or more	25 daily
WHITE BASS (barfish)	7 inches or more	25 daily
CRAPPIE (white perch, speckled perch, sac-a-lait)	7 inches or more	25 daily
SUNFISH (perch, bream, goggle-eye, blue-gill, etc.)	5 inches or more	100 daily

CLOSE SEASONS AND CLOSE ZONES

No state-wide close seasons on game or commercial fish. Department of Conservation can authorize close seasons or close zones in any waters where necessary, otherwise fish can be taken at any time or place provided size limits and other restrictions are observed.

ANGLER'S LICENSE PROVISIONS

LICENSE YEAR JANUARY 1 TO DECEMBER 31

Residents, per annum	50c
Non-resident, per annum	$2.00

Residents: Required of all persons 15 years of age and over.

Non-resident: Required of all non-resident anglers fishing for fresh and salt water game fish, irrespective of tackle or bait used.

ISSUED BY DEPARTMENT OF CONSERVATION
ROBT. S. MAESTRI, COMMISSIONER
NEW ORLEANS COURT BUILDING, NEW ORLEANS
TELEPHONES MAIN 1914-1915-1916

†NOTICE—Federal Bag Limit of 15 ducks and 4 geese daily must be observed.

DOVE SEASON IN LOUISIANA—DECEMBER 1 THROUGH JANUARY 31—MUST BE OBSERVED AS ONLY OPEN SEASON.

Since the above Chart was printed The Federal Regulations have been changed as follows: Bag Limit for Two Days 24 Ducks. Ducks 12 per Day Not to Exceed 8 of Any Species.

(Continued from Page 23)

stables were vested with powers of Conservation Agents—they were authorized to receive one half of the fees collected. A conservation fund was established and it was stipulated that the expenses for clerical force were not to exceed $20,000.00. An annual report of the department's activities was required to be submitted to the Governor. The department was domiciled in the city of New Orleans. The Department of Mining and Minerals was one of the several divisions to be established in the Commission. This department was charged with the enforcement of all laws, rules, and regulations pertaining to the mineral resources of the state.

The three Commissioners appointed were: M. L. Alexander, President, J. A. Dayries, and E. T. Leche. The Commission adopted 11 rules and regulations for the protection of the oil and gas fields of the State. The Biennial Report[32] of 1914 states that "the operators welcomed the intervention of the Commission and the adoption of rules and regulations . . . The greatest menace to conservation of gas that confronted the Commission at the time of its creation was the unchecked flow of the wild gas well on the Dawes tract, near Oil City, in the Caddo field." This well had been discharging about 40 million cubic feet of gas per day in 1908 and at the time of its closure it was discharging about 12 million cubic feet. The Commission did not have sufficient funds at its disposal to meet the expense of closing the well and created a fund for this purpose through subscriptions obtained from the operators in this field. The Commission's representative, J. W. Smith, took charge of the work and the well was closed under his direction.

At the end of the first two years of the Commission's activities, a biennial report[33] was submitted to the Governor in which it was stated that "the public is gradually being brought to a clearer appreciation of the value of the State's resources and the fact that the concentration of authority in a single body adds strength, efficiency and consistency to its undertaking."

Act 196 of 1910, authorizing the state to levy an annual license tax upon all persons, firms, and corporations in the business of severing natural products from the soil, including oil, gas, sulphur, and salt, was amended in 1912.[34] At this time the Governor was also authorized to lease vacant and unappropriated public lands belonging to the State for the development and production of oil, gas, coal, salt, sulphur, lignite and any other mineral.[35] Fred J. Grace, Register of the Land Office, reported in 1914 that "the state has withdrawn all vacant state lands in ten parishes, situated in the northwestern part of the State and vast areas of these lands have been leased out to companies prospecting for oil for a fair consideration and a good royalty in case oil and other minerals are discovered on them, the State stands well to profit in the future."[36]

In 1914 the Police Juries of the several parishes of the State were given the power to levy an annual license tax upon all persons, firms, corporations, or associations of persons, engaged in the business of severing natural products. The act specified that "persons who may become subject to said license tax shall make a report of their business," and also authorized "the provision of penalties for violation of any act or ordinance of the several Police Juries." The annual license tax was not to exceed the amount levied by the State.[37] Definite information regarding this tax is not available, but it appears that the tax was levied only in a few parishes, and only for a short period.[38]

At the meeting of the Legislature in 1914, the Conservation Commission was authorized to collect the license tax imposed by Act 209 of 1912. The Commission was vested with all the powers and authority which had been heretofore conferred upon the State Auditor, and the reports which had been previously made to the Auditor were to be made to the Conservation Commission.[39]

At this meeting of the Legislature, the Governor was authorized[40] to withdraw from sale or entry any of the vacant and unappropriated public lands and lake bottoms belonging to the State whenever, in his opinion, they appeared to be more valuable for mineral than for any other purpose, and to ratify and confirm all withdrawals made under the act[41] of 1912.

In 1915, the Governor was empowered to provide the terms and conditions of leases and to have the Register of the State Land Office inspect such lands. The lands were to be sold in public to the highest bidder.[42] The Register of the State Land Office in 1916 reported[43] that in the past year the State had received cash bonuses amounting to $32,359.10 for the granting of the leases, and that the "State is to receive royalty considerations, ranging from one-eighth to one-sixth from the production." The sum of $258.91 was received in royalties. A sum of $28,617.80 was received in bonuses and royalties from April, 1916, to April, 1918,[44] from State leased lands for the exploitation of minerals.

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[32] *Report of Conservation Commission*, La., 1912-1914, p. 17.

[33] *Ibid.*, p. 6.

[34] *Acts* of La., No. 209, 1912, p. 437.

[35] *Acts* of La., No. 258, 1912, p. 582.

[36] *Biennial Report*, Register of the State Land Office, 1914, p. III.

[37] *Acts* of La., No. 296, 1914, p. 605. The constitutionality of the act was upheld in the case of *Standard Oil Co.* v. *Police Jury of Red River Parish*, 140 La. 42.

[38] Information obtained from Ralph Washburn of the Office of Supervisor of Public Accounts of Louisiana.

[39] *Acts* of La., No. 41, 1914, p. 104.

[40] *Acts* of La., No. 38, 1914, p. 102.

[41] *Acts* of La., No. 258, 1912, p. 582.

[42] *Acts* of La., No. 30, 1915, p. 62.

[43] *Biennial Report*, Register of the State Land Office, 1916, p. 6.

The name of J. A. Dayries, one of the three commissioners, was replaced by Wm. S. Holmes in the second biennial report of the Conservation Commission.[45] M. L. Alexander, President, and E. T. Leche, remained as the other two members of the Commission. J. W. Smith, Superintendent of the Department of Mines and Minerals, stated in his 1915 report that "the territory to be covered is large and the funds available for the department are small in comparison, but thanks to the courtesy of the large operating companies and to the desire on the part of all operators to strictly comply with the laws, this department has been able to obtain results that otherwise would have been impossible."[46] The estimated expenses for the following two years for the conservation of timber, minerals, oil and gas amounted to $15,000.00, a sum which did not include the salaries of the agents and the office staff.

The act of 1912, creating the "Conservation Commission," was amended in 1916 so as to define it as the "Department of Conservation," and designated that it was to be directed and controlled by an officer known as the "Commissioner of Conservation."[47] The Governor, by and with the consent of the Senate, was to appoint the "Commissioner of Conservation" for a term of four years. This Commissioner was given supervision and control over all employees in every branch of the service. He gave his full time to the services of the Commission and received a salary of $3,600.00 per year. M. L. Alexander was appointed Commissioner of Conservation. In his report to the Governor in 1918, he analyzed the existing status of the Department as follows: "The Department of Conservation created by Act 66 of 1916 to succeed the Conservation Commission of Louisiana is charged not only with seeing that all laws relative to the protection of the natural resources of the state are enforced but we are charged with the duty of improving and enlarging the state's resources as well as conserving them." He stated that although the "Department of Conservation is charged with the conservation of the oil and gas fields and other mineral resources of the state, it has received no moneys from the license tax collected from these resources for the proper administration of the work."[48]

The Commissioner in his report to the Governor in 1918 recommended "that the appropriation of $150,000.00 for the department be increased to $175,000.00."[49] The estimated expenditures per annum for the following two years for the Minerals Division was placed at $15,000.00, an amount which did not include the salaries and expenses of the office assistants and the agents.

The summary of the activities of the Division of Mines and Minerals for the years 1918 to 1920 was given as follows:

> "In this division of the work, the most important activities of the department are the conservation of gas and oil. The general provisions for this work are found in Act 254 of 1910, which authorizes the department to supervise all mining operations, to prevent waste in drilling, piping and using of gas and oil. Act 268 of 1918 prevents the use of natural gas in such quantities as to threaten the common source of supply, and empowers the department to limit the flow of any well for 24 hours to 25 per cent of its potential capacity and to prohibit the use of pumps to accelerate the natural flow. Act 270 of 1918 provides that the department may limit the proportion of natural gas that may be taken from a common source by any person, firm, or corporation.
>
> "Act 190 of 1910, requiring that gas and oil be properly confined within pipes and proper receptacles within two days after a well has been brought in, and Act 71 of 1906, directed against those who wilfully and intentionally set fire to gas and oil or permit them to go wild or who attempt to divert gas from pipe lines, and requiring the plugging of abandoned gas wells to prevent the introduction of water into the gas sands, give the department ample and specific power to prevent the waste of gas and oil."[50]

Thus with the gradual change of economic conditions, the State has become increasingly alert in the conservation of its natural resources. From the first investigating committee of 1908, the Department of Conservation had evolved by 1918 into a complex organization requiring the services of specially trained officers. The State Government of Louisiana through the efforts of the Department of Conservation, has been almost entirely responsible for the administration of Conservation laws. In addition to these activities, research leading to more adequate conservation of Louisiana's natural resources has been carried on by the Department of Conservation. This paper has attempted to portray the development of the Department of Conservation to the year of

(Continued on Page 37)

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[44] *Biennial Report*, Register of the State Land Office, 1918, p. 4.

[45] *Report of Conservation Commission*, La., 1914-1916, p. 3.

[46] *Ibid.*, p. 75.

[47] *Acts* of La., No. 66, 1916, p. 172.

[48] *Biennial Report*, La. Dept. Consv., 1916-1918, p. 5.

[49] *Ibid.*, p. 179.

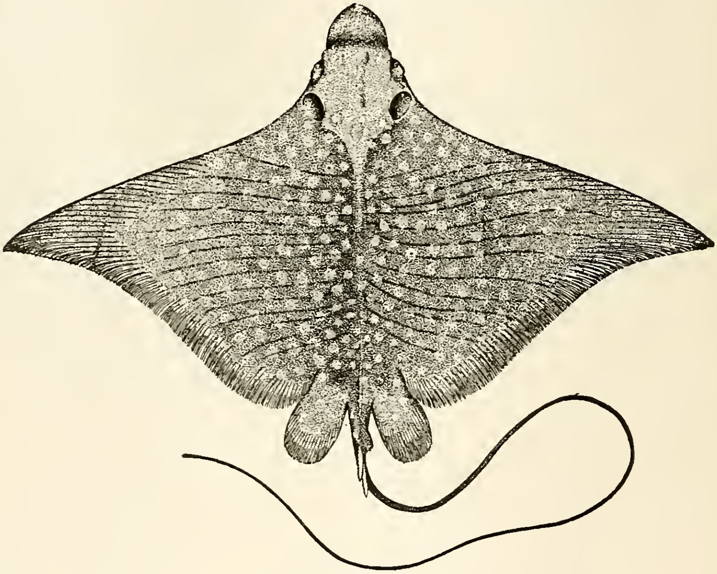
[50] *Fourth Biennial Report*, La. Dept. Consv., 1918-1920, p. 7.

The Louisiana Elasmobranchs

By
FORREST V. DURAND
Assistant Biologist, Bureau of Scientific Research and Statistics, Louisiana Department of Conservation

Sharks and Rays of the Louisiana Coast

THE fantastic, the monstrous, the gigantic; that which comes nearest to being the unreal always creates the greatest interest. Therefore of all fishes the Elasmobranchs attract the most attention and comment. To this large group belong the sharks, rays, sawfish and skates. Herein fall, among the more spectacular, that grim raider of the deep, the Tiger Shark, the five thousand pound bat-shaped Devil Fish and the devastating twenty foot Sawfish with its eight foot saw-like weapon of destruction. A great variety of representatives of the group are present along the Louisiana coast and offer an unequaled attraction to those who seek thrills, adventure, rare sport and the joy of seeing things thought of in dreams of distant climes.

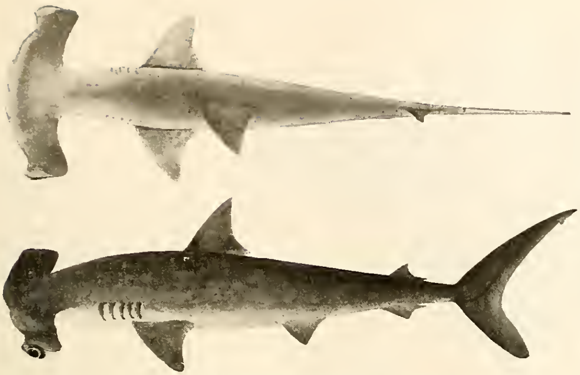


THE SPOTTED WHIP RAY

Thrills unexcelled can be had by spending a day shark fishing off Grand Isle. It is necessary to go several miles offshore to catch the really big fellows. In fact, they get progressively larger the farther seaward one goes. Fifteen miles southeast of Barataria Pass the water is a clear blue; indescribably blue; bluer and clearer than the sky above. The sun's rays penetrate like golden-lined shafts far below. Suddenly about your boat sharks will begin to appear. A little bait thrown overboard will bring schools of them milling about. It is a scene of great beauty tinged with a certain sinister aspect to see these graceful creatures gliding through the azure deep. One instant the water is empty and the next great dull grey bodies appear wraith-like out of nowhere. Some are deep down and appear only as dusky shadows while some cut the surface with their dorsal fins.

In the school will usually be seen one or two Lemon Fish or Cobia, *Rachycentron canadus* (Linnaeus). These can be distinguished from the Elasmobranchs instantly by the position of their mouths which are on the anterior tip of their bodies, not ventrally located as in the sharks, and by their conspicuous lemon colored lips which instantly catch the eye as they swim past. While they reach a length of four feet or more they will be found in the company of still larger sharks. No explanation can be given as to how they survive this strange company since they do not seem to be rapid swimmers. In spite of this seeming evidence of sociability, the sharks are exceedingly voracious. It is disputed as to whether or not sharks will actually attack men but it is this writer's humble opinion that when hungry enough the larger ones will attack anything which gets in their path and has not the speed nor agility to escape. Their sanguinary habits well earn for those belonging to that group the grim name of Requiem Sharks which has been given to them.

Seen in more murky waters such as those off the mouth of the Mississippi River Sharks lose all the appearance of beauty which the clear blue open gulf lends them. Here one only realizes their



HAMMERHEAD SHARK
These queer brutes look more like products of a pipe dream than an actual living inhabitant of Louisiana waters.

presence when sharp dorsal fins cut the surface about the boat. This always causes a peculiar feeling in the pit of the stomach—then the fact is brought to mind that the shark is simply one great mass of ravenous appetite equipped with rows and rows of razor-edged teeth. Quite frequently they bite huge holes in shrimp trawls in their efforts to get at the ensnared catch and they take readily any type of bait. A strong line and stout hook with heavy wire or chain leader must be used for they put up a terrific fight and the angler must use care to avoid being jerked overboard. It is dangerous to hoist one of any size aboard before it is dispatched for one blow of its mighty tail may cause severe injuries.

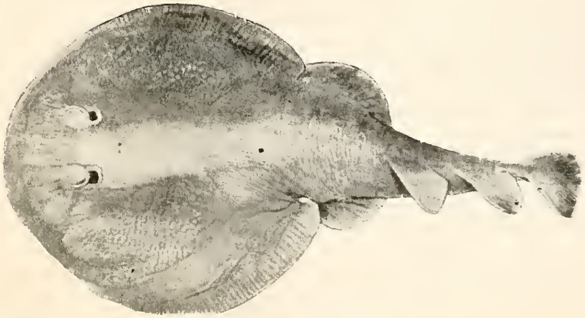
Several species of sharks are found along the Louisiana coast. The most common one in this region is the Spot-fin Ground Shark *Carcharias limbatus* (Muller & Henle). This fish is a great leaper. They have been seen to jump as high as twelve feet out of the water and it is common to see them spin top-like three or four feet into the air several times in succession hitting the water with a great splash at the end of each leap. The reason for this performance is not known; one explanation being that they do it to shake themselves free of remoras or shark-suckers.

The grotesque Bonnet-head Shark or Shovel-headed Shark, *Reniceps tiburo* (Linnaeus) is very common in this region and the closely related Hammer-head, *Sphyrna zygaena* (Linnaeus) is occasionally seen. These queer brutes look more like the product of a pipe-dream than an actual living inhabitant of Louisiana waters. The gigantic Whale Shark, *Rhineodon typicus* Smith, which reaches a length of nearly fifty feet and a weight of twenty-six thousand pounds has never been recorded near the Louisiana coast, but the Red Snapper fishermen working on the snapper banks off the mouth of the Mississippi River tell tales of seeing huge monsters which must be this species or some representative of the group. Several other sharks reach a considerable length. The Basking Shark approximates forty-five feet and the Tiger Shark thirty. The fierce Man-eater, *Carcharodon carcharias* (Linnaeus), most ferocious of its kind, attains a length of over forty feet. Dull white in color this Gargantuan creature floats beneath the bow of every ship in tropical ports lying in wait for any falling morsel from an eggshell to a human being.

The fantastic Saw-fish, *Pristis pectinatus* Latham, is common in the mud flats and off certain beaches along the coast, but large individuals are comparatively rare. However, the writer saw one captured by a shrimp trawler which appeared to be at least fifteen feet long. They are seldom caught with hook and line but are usually taken in seines and trawls. Like most Elasmobranchs the Sawfish gives birth to living young, however at the time of birth the saws of the young are covered with a membraneous sheath which protects the mother from injury.

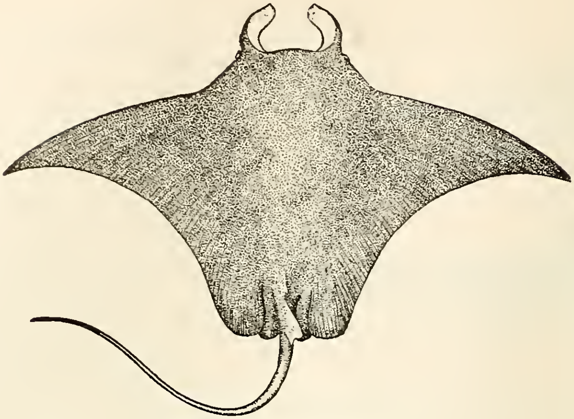
The Skates, which resemble closely the Rays, are the egg-laying or oviparous representatives of the Elasmobranchs. These are rather rare in tropical and semi-tropical waters, but some are found in the Grand Isle vicinity.

Perhaps the most grotesque and fantastic of all sea vertebrates are the Ray Fish. Electric and Torpedo Rays with powerful electric shocking organs occur in the Gulf though they are not as plentiful along the Louisiana coast as some of the other species. Greatest of all the Rays is the Great Manta, Devil Fish or Sea Bat, *Manta birostris* (Walbaum). Specimens of these great



TORPEDO RAY OR TREMBLER

monsters have been taken which measured over twenty feet in width and weighed over three thousand pounds. The writer has seen scores of them sometimes in great schools of fifty or more off our coast. To gaze upon them milling about on all sides; to try to harpoon one with a pike-pole and have the sharp weapon bounced back by the tough hide; to have them rise up almost beneath your boat sends a wild thrill of adventure through your body and imprints a never-to-be-forgotten picture on the mind.



GREAT MANTA (Sea Devil, Sea Bat)
This great monster attains the weight of over four thousand pounds and the width of over twenty-five feet.

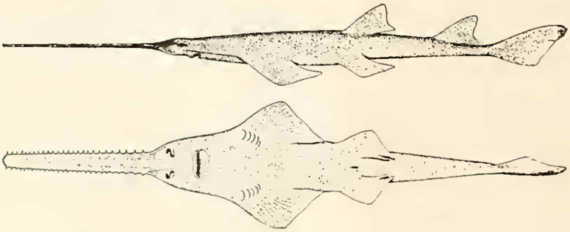
The Spotted Whip Ray, *Stoasodon narinari* (Euphrasen), acquires its common name from its extremely long tail which, in the young stages, reaches a phenomenal length. Sometimes it is nearly three times the length of the animal's body. The writer once saw a specimen ten feet wide taken in a shrimp trawl. This animal has a head shaped very much like that of a cow. The cow-nosed Ray, *Rhinoptera quaduloba* (LeSueur), another inhabitant of our Louisiana coastal waters, is of a light brown color and can often be seen swimming on the surface in a typical sidewise manner. These smaller surface swimming Rays lend a touch of beauty to the waters of Barataria and Caminada Bay. Furthermore, they do not create in one the sense of fear or foreboding which the larger Elasmobranchs do. The Butterfly Ray, *Pteroplatea micrura* (Schneider), is probably the most graceful of all our small Rays. In contrast, the Common Sting Ray or Stingaree, *Amphotistius sabinus* (LeSueur), is the ugliest and at the same time the most common Ray along the Louisiana coast, being especially abundant in the mud flats of our coastal bays.

While the Rays create a great deal of popular interest and speculation and many strange tales and superstitions are prevalent in connection with them, comparatively little is really known about the group. This is particularly true in regard to the larger ones such as the Devil Fish. Apparently they feed mainly on clams and other shell-fish. The inner parts of their mouths are fashioned into various kinds of grinding plates and surfaces which enable them to crush this type of prey. Recently it was discovered that rays actually have a poison gland located at the base of the barbed spine on their tails. The poison when expelled flows down the grooved surface of these spines. With this terrible weapon a severe wound can be inflicted and the writer has seen them literally tear other fish to bits. Sharks prey upon the Sting Rays and quite often when caught spines will be found embedded in their mouth parts. Catfish spines also are found buried in shark's heads. Apparently the Shark is not harmed by these embedded barbs.

The Rays offer an unbounded source of pleasure to thrill seekers, and it is great sport to play tug-of-war with them, though nothing short of a good sized rope will hold the larger ones. For these it is best to use a harpoon. Sharks, Sawfish, Devil Fish, Elasmobranchs of all kinds lend a touch of weirdness and savage life to our coast; and for those seeking thrills, sport fishing or sight-seeing, these waters have attractions equal to any held by far-away seas or shores.

Lubricating oil made from whale oil at a cost of $1.50 per barrel is a process claimed to have been patented by a Japanese scientist.

A new use for whale oil which would consume a consequential volume might be expected to improve the economic condition of the whale and copra oil industries.



THE SAWFISH
This fish reaches the length of from fifteen to twenty feet.

Semi-Annual Forest Fire Report For Louisiana January 1 To July 1, 1933

By V. H. SONDEREGGER,
Director Forestry Division

HEREWITH attached is a detailed statement of the results obtained by the Division of Forestry of the Department of Conservation in the protection of forests in Louisiana during the six months period from January 1, 1933, to July 1, 1933.

The Division of Forestry has been very fortunate in receiving a great deal of co-operation from the public throughout the State. President Roosevelt's proposed reforestation projects for the nation, as released through the press during March, acted as an incentive in creating a respect for the forests and materially assisted in making the public more careful with forests. Supplementing this publicity, the weather conditions, particularly the heavy rainfalls at the right times, materially aided in reducing the fire hazard. With these two factors in their favor, the employees of the Division of Forestry were able to report a very favorable condition as the data herewith will show.

An analysis of the last two years of six month periods will show that in 1932, 2,361 fires were reported, whereas in 1933, 1,186 fires were reported. The total area burned in 1932 consisted of 108,424 acres, while only 44,485 acres burned in 1933. The per cent of loss in 1932 was reported as 1.9% and this was materially reduced for 1933, as the percent shown is .8% loss. The size of the fires was reduced, as the average acreage per fire in 1932 constituted 45.9 acres, whereas the average size in 1933 was 37.5 acres. The total loss involved in forest fires on the protected unit for the first six months of 1932 was $75,251.00; in 1933, a loss of only $35,161.00.

TABLE No. 1

Summary of Reported Fires for Protected Areas in Louisiana

January 1-June 30, 1933

PROTECTION AREA	Area Protected (Acres)	Number of Fires	Area Burned (Acres)	Per Cent Burned	Average Size Fire (Acres)	DAMAGE			SUPPRESSION	
						Timber	Other	Total	Hours of Fighting	Est. Cost
Morehouse	149,760	50	1,488	1.0	29.7	$ 1,488	$ 30	$ 1,518	346	$ 96
Union	350,000	87	2,251	.6	25.9	2,237	42	2,279	618	178
North Louisiana*	2,100,000	265	6,564	.3	24.8	4,607	130	4,737	2,359	615
Bienville-Jackson	800,000	60	2,005	.3	33.4	1,460	41	1,501	409	120
Sabine	300,000	3	17	.0	5.7	17	....	17	7	2
Vernon	5,000	.....	......	...	....	....	....	....	.....	......
Beauregard-Calcasieu	75,000	4	30	.0	7.5	8	....	8	.....	......
Allen	154,580	101	4,519	2.2	44.7	1,186	82	1,268	661	215
Livingston	290,000	109	2,488	.8	22.8	2,374	53	2,427	1,349	353
St. Helena-Tangipahoa	400,000	184	10,467	2.6	56.8	10,047	201	10,248	1,188	324
Washington-St. Tammany	590,000	218	10,283	1.7	47.1	8,168	205	8,373	2,319	613
St. Tammany	110,000	105	4,373	4.0	41.6	2,699	86	2,785	486	134
St. Landry	11,000	.....	......	...	....	....	....	....	.....	......
State Forest	7,500	.....	......	...	....	....	....	....	.....	......
Totals	5,342,840	1,186	44,485	.8	37.5	$34,291	$870	$35,161	9,742	$2,650

*Comprising the Parishes of Winn, Caldwell, La Salle, Grant, Natchitoches, and Ouachita.

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Corals from Wells on the Mississippi Delta

By JOHN W. WELLS*

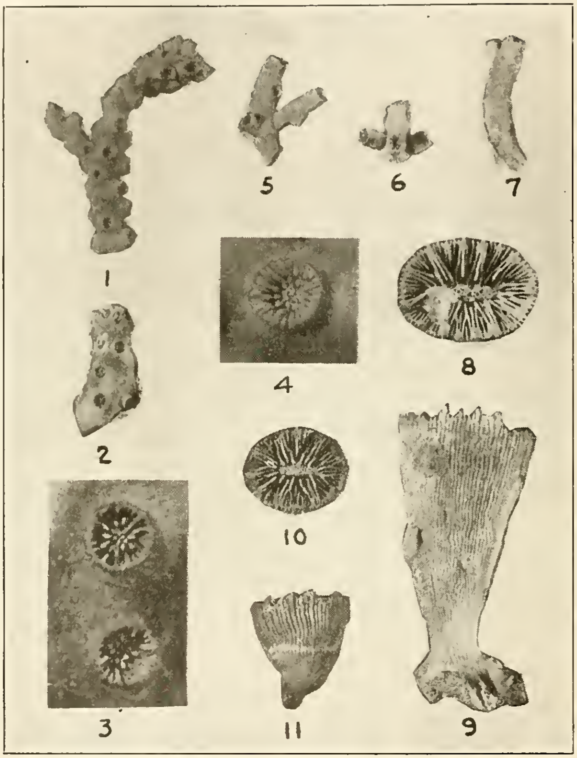
THROUGH the kindness of Mr. Cyril K. Moresi of the Louisiana Department of Conservation I have had the opportunity of examining some fossil corals obtained from wells located on the delta of the Mississippi River.

The specimens are in an excellent state of preservation and come from depths of 800 to 1275 feet in wells about the Garden Island Bay Salt Dome south of Pass-a-Loutre.[1] They belong to three well-known species which are now living in the Floridian area and are interesting because they appear to be the first fossil corals to be noted from this region.

While the age of the sands containing these three species cannot be determined with certainty on the basis of the corals alone, their evidence is nevertheless of some importance. From previous data the geologic ranges of the species are as follows:

Cladocoro arbuscula
Pleistocene-Recent
Oculina diffusa
Pleistocene-Recent
Balanophyllia floridana
Recent

From this, the age of the sands would not appear to be earlier than Pleistocene.



Explanation of Plate 1

Fig. 1. *Oculina diffusa* Lamarck. Branch of a recent specimen. xl.
Fig. 2. *Oculina diffusa* Fossil specimen from the Mississippi delta. xl.
Fig. 3. *Oculina diffusa* Calices of the fossil specimen. x4.
Fig. 4. *Oculina diffusa* Calices of the recent specimen. x4.
Fig. 5. *Cladocora arbuscula* (Le Sueur). Branch of a recent specimen. xl.
Fig. 6. *Cladocora arbuscula* Fossil specimen from the Mississippi delta. xl.
Fig. 7. *Cladocora arbuscula* Fossil specimen from the Mississippi delta. xl.
Fig. 8. *Balanophyllia floridana* Pourtalès. Calice of a recent specimen. xl.
Fig. 9. *Balanophyllia floridana* Lateral view of a recent specimen. xl.
Fig. 10. *Balanophyllia floridana* Calice of fossil specimen from Mississippi delta. xl.
Fig. 11. *Balanophyllia floridana* Lateral view of fossil specimen. xl.

FAMILY ASTRANGIIDAE VERRILL
GENUS CLADOCORA EHRENBERG 1834

Cladocora arbuscula (Le Sueur) 1820 Plate 1, Figs. 5-7

Nine specimens of this species were examined. They are indistinguishable from recent ones except for slight discolorations. Most of them show evidence of post-mortem wear or rolling on the bottom. For comparison with the fossil form a shallow water specimen from Tortugas is figured. At the present time this species is found in the West Indies in shallow quiet water and at depths from 8 to 20 fathoms.

FAMILY OCULINIDAE
MILNE EDWARDS & HAIME
GENUS OCULINA LAMARCK 1816

Oculina diffusa Lamarck 1816

Plate 1, Figs. 1-4

This species is represented by a single specimen in good condition. It is thoroughly typical of the species, as will be seen from the figure. Figure 1 shows a similar specimen from the living reef tract at Tortugas, Florida. The present bathymetric range of the species is from 10 to 16 fathoms or where the water is very quiet.

FAMILY EUPSAMMIIDAE
MILNE EDWARDS & HAIME
GENUS BALANOPHYLLIA SEARLES-WOOD 1844

Balanophyllia floridana Pourtalès 1868

Plate 1, Figs. 8-11

One specimen examined. It has a small, cornute corallum 19 mm. in height and with a mod-

(Continued on Page 35)

Louisiana Nature Guardians

"Upon my honor, as a Louisiana Nature Guardian, I promise to take care of all our natural friends, to guard and protect them to the best of my ability, and as far as possible influence others to do the same."

HOW YOU CAN BECOME A NATURE GUARDIAN

YOUR PART

Consult your teacher.

Ask that the purpose and plans of the Nature Guardian Club be explained to you and the class.

Ask for an application card.

Get a responsible person to indorse it, after proving that you fully understand the duties of a Nature Guardian.

Sign the application and mail the card postpaid, or give to your teacher, to send with cards from all the class.

OUR PART

We send the application card.

We send you a handsome badge, a certificate of membership, Nature Guardian pamphlets, and other literature.

This is all free, and is carried on with the purpose of instilling in the children's minds a knowledge of Louisiana's wild life and a thorough understanding of its economic value to the State.

It also aims to develop individual humanitarianism. Even within this short time an amazing improvement has been made in the mental attitude of our young folks toward the conservation and protection of Louisiana's natural resources.

EDITORIAL

My Dear Guardians:

Again you are entering upon a school term that should result in a richer and fuller knowledge of the worthwhile things of life. Each fall sees the boys and girls of Louisiana eager to take up their school duties and to carry them on to a successful finish.

The Editor is anxious for the Nature Guardian work to go forward with dispatch. Practically all schools have one or more Clubs, and their success depends upon the enthusiasm of the teacher, the Senior Guardian, and especially, upon the interest shown by the members.

These Clubs offer a great opportunity for Guardians to promote the cause of conservation, for conservation HAS COME TO STAY in Louisiana.

You Guardians realize that the intelligent use and wise management of our natural resources are of the greatest importance to the industrial welfare of our state. Louisiana has been greatly blessed in the extent and abundance of her natural gifts, and needs loyal Guardians to help her protect them, to see that they are wisely used, and to urge replacement where there can be replacemnt.

Louisiana forests represent untold wealth. If we can protect them from fire, insects, and disease, they will serve us well in the form of lumber, houses, furniture, pulpwood, and in many other products.

Our fisheries mean unlimited riches to the State; our fur bearing animals are really gold bearers; our oil and gas bring in millions annually.

Nature Guardians of Louisiana, you are the natural heirs of all these riches, which represent the means and methods by which you will earn your living when you reach manhood and womanhood. It is right and just that you should cherish your State's natural wealth, and lend your best efforts for its conservation.

So, Guardians, let us start the new term with the determination to keep the purpose of the Club well in mind and to make each meeting a real live demonstration of what Louisiana Nature Guardians can do to help their state, their community, and their schools.

Yours for a successful year,

Nature Guardian Editor.

INDIAN SUMMER

William A. Bartlett

Sad days have come, and sadness everywhere
Fashions the earth to suit its mournful lay;
Nature is clothed in sorrying array;
The wood is but a place of wan despair;
No songster's melody is in the air;
The last angelic strains have died away
And voices that were throbbing yesterday
Today are blending in a clime more fair.

But summer once again attempts to raise
Her vanquished standard in the hazy air;
Again arise the laggards lonely lays,
As though his winter banishment to dare!
But well he knows these late returning days
Are only ghosts of other days more fair.

OCTOBER

October days are sunny
And skies o'er head are blue,
The droning bees are busy
And flowers in beds are few.

The nuts are falling on the ground,
The golden rod is dying,
And leaves are falling on the ground,
And birds to South are flying.

—SELECTED.

Letters from the Guardians are coming in briskly. We are always glad to get such an interesting one as the following:

Little Creek, La.,
Aug. 17, 1933.

Dear Editor:

I am a young girl fourteen years old. Since I have been reading your Conservation Review, I have become greatly interested in your Nature Club, and I would like very much to become a member. I am fond of all sports, but like hiking, boating and swimming the best. I love a country life and I also love birds and animals.

Please send me the cards and other necessities to join. I would also like to receive Nature Guardian pamphlets and other literature. I will be anxiously awaiting your reply.

Yours truly,
(Signed) ROBBIE EUNICE MILLS,
Little Creek, La.

Our member from Tullos has the right idea about belonging to our Club:

Tullos, La.,
August 15, 1933.

Dear Editor:

You all know I enjoy being a "Nature Guardian," and enjoy seeing everyone else being one also.

Almost every boy and girl belongs to the "Nature Guardian Club" so please send me two bundles of cards. One bundle of cards for Vandie Meredith.

Sincerely yours,
(Signed) ANDIE MEREDITH.

Dear Ineta, if you have not yet received your certificate and badge, please let me know and I'll see that you get it at once. Sometimes our supply is exhausted and we have to delay sending them until the new ones come in.

Blade, La.,
Aug. 22, 1933.

Dear Editor:

A month ago I filled in my application for membership and returned it properly filled out, but I have not yet received my certificate of membership or my badge. Will you please tell me why?

Very truly yours,
(Signed) INETA JERNIGAN,
Blade, La.

PRIMARY SCHOOL PUPIL WINS BIRD HOUSE PRIZE

Ivory Rodrigue sends The Jefferson News the following communication:

"Dear Reader: I am a pupil of the Gretna Primary No. 2 school. Several weeks ago I joined the Louisiana Nature Guardian Club. I wish to be a good Nature Guardian.

"Since my class joined this club my teacher had a Bird House Contest. We began it last week in our room. The contest took place Monday, March 20, 1933. I won the first prize with my Bird House."

KENNETH HEBERT—NATURE GUARDIAN

Kenneth Hebert, a pupil of the fourth grade of Gretna Primary No. 2 school, writes to tell us that he is a member of the Louisiana Nature Guardian Club.

"I joined the club several weeks ago," he writes. "I have a membership pin and certificate. Since my whole class joined the organization our teacher held a bird house contest which was a big success. Many fine houses were built for our feathered friends."

LOUISIANA

Rev. V. Baron

I

Do you know there's a land where the sky's always blue,
The flowers always young and the sun always bright;
Where each lane is moon-kissed, and every love is true,
Where the elves on the breeze carry your cares so light?

CHORUS

O Louisiana, Land of Evangeline,
Beloved daughter of old Man River;
Shady cradle of my sweet heroine,
Thy name to me is as sweet as a prayer.
New Acadia, land of romance and love,

To thee my heart will belong for ever;
Till the heavenly shore whereon my soul will rove,
I'll always sing: To forsake thee, Never!

II

Have you seen the emerald of the winding bayous,
And the giant mossed trees robed in their majesty;
Have you seen in gardens flowers dripping with dew
Of the lakes, at twilight, the great and calm beauty?

III

Have you heard warbling birds in the golden rice coves,
And the darkies' minstrels in cotton field afar?
Have you heard, with a smile, by the blossoming groves,
The laughing of a kiss under a twinkling star?

Prentiss, we are mighty glad to have you become a member. Your poem is good!

Dear Editor:

I am a lover of nature. I am always getting scolded by my mother for playing with dogs, cows, or chickens. There is a lady who has some chickens, some ducks, and two cows. Every day I feed the cows grass, the chickens leavings from the table, and the ducks swamp grass.

I myself, have a bird and two gold fish. Before I eat breakfast I give the bird fresh water and new seeds.

Please make me a member of the Louisiana Nature Guardian Club. Upon my honor I promise to abide by the rules like a true Nature Guardian.

Your friend,
PRENTISS M. DAVIS, JR.

RED THE ROOSTER

Prentiss M. Davis, Jr.

I have a little Rooster
I always call him Red,
He will spur you
In the leg or in the head.

When you go in my back yard
You better take a stick,
For if you don't watch out
He'll do that spurring trick!

We extend a hearty welcome to all of our new members, and hope they will become happy, useful, and faithful Guardians.

We shall be glad to hear from our members at any time, and shall be glad to print their poems, themes, and letters about any of the natural resources of Louisiana. We hope that our next issue will contain many interesting articles by members of our Club.

Address all letters to: NATURE GUARDIAN EDITOR, DEPARTMENT OF CONSERVATION, New Court Building, New Orleans, La.

CORALS FROM WELLS ON THE MISSISSIPPI DELTA

(Continued from Page 32)

erately deep, compressed calice measuring 14.5 x 18.5 mm. The point of attachment is small and recurved. The septa are in four complete cycles with the fifth developed in some of the systems. The columella is spongy and compressed, 7.5 mm. in length and 1.5 mm. wide, when viewed from above. On the exterior the costae are distinct from the calicular margin to the base, rounded and slightly alternating in size, with single rows of granulations and porous in structure near the calice. The wall is porous near the calice and half-way down the sides of the corallum but is filled up solidly below.

The above is a brief description of the single specimen. When compared with Pourtalès' figures and descriptions[2] and with specimens from a depth of 39 fathoms off Tortugas, there is little doubt as to its identity with the recent species. This form is not a reef-builder and is found living at depths between 26 and 63 fathoms along the Florida coast. It has not been found hitherto in the fossil state.

---

*Homer, New York.

[1] The fossil corals were obtained at the following depths from three wells drilled on the Garden Island Bay salt dome, Plaquemines Parish, by The Texas Company: Garden Island Bay No. 4, depths of 680 feet and 1275 feet; Garden Island Bay No. 5, well blew out while drilling through a sand rock at a depth of 801 feet; Garden Island Bay No. 6, well blew out at a depth of 816 feet.

[2] Pourtalès, L. F. *Bull. Mus. Comp. Zool.*, vol. 1, no. 7, p. 137. 1868.

Pourtalès, L. F. *Ill. Cat. Mus. Comp. Zool.* no. 4, p. 41, pl. 4, figs. 5, 6. 1871.

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Cause and Cure of Dry Rot in House Wood-Work

Information Available on Damage to Damp Timber by Fungus Growth and On How to Stamp Out Infection

By CARL HARTLEY
Forest Pathologist, Bureau of Plant Industry, Department of Agriculture

"DRY ROT" in houses, decay infections in stored lumber, and heart rot in shade and forest trees, are among the subjects receiving attention by the Bureau of Plant Industry.

What are the causes of building rots, and what information can the Department of Agriculture give on the subject?

The causes of all decay of wood are found in fungi, microscopic forms of plant life. There are fungi everywhere present capable of ultimately rotting wood that is kept moist. In addition there are three or four species of true house fungi that can spread from moist wood into dry wood by carrying water with them.

The house fungus hazard somewhat resembles the fire hazard in that relatively few buildings suffer, but the damage caused in houses attacked may be serious and the infection is sometimes difficult to stamp out. The principal house fungi have been known in exceptional cases to destroy in a few months the lumber that had been used to replace the originally decayed material. They are most frequent in the Southern States and the Pacific Coast, and appear to be on the increase partly as the result of modern architectural styles which hinder air circulation.

Wood that is really dry never decays; strictly speaking there is no such thing as dry rot. All serious decay trouble is due to construction practices that fail to safeguard wood against moisture, or failure to use preservative treatment in situations where moisture in unavoidable.

Precautions that will safeguard wood in new construction, as well as information on the eradication of infections in old buildings, can be obtained from Extension Service Circular No. 78 published by the Alabama Polytechnic Institute in cooperation with the Department, and advice for handling special cases can be secured by writing to the Forest Products Laboratory, Madison, Wis.

The subject has not yet been given enough study to determine why houses of apparently similar construction differ in liability to attack, or which ones of the generally recommended precautions can be safely omitted.

Decay should not be confused with the destruction of wood by termites, frequently referred to as white ants. Their work can be distinguished from that of the decay fungi by the definite tunnels which they eat in the wood. They are dealt with by the Bureau of Entomology, and advice on their control is furnished on request to the Department of Agriculture at Washington.

What help is available in avoiding decay infections in stored lumber?

Department of Agriculture Bulletin No. 510 (20 cents) contains information and illustrations on the proper handling of lumber to avoid yard infections. So far as the available staff permits, laboratory diagnoses are made of samples of wood in which discoloration has led wood users to suspect incipient decay. Specimens for such examination should be submitted to the Forest Products Laboratory above mentioned.

What advice can the Department offer on decay in living shade trees?

Heart rot does not ordinarily affect the health of trees, but may result in mechanical breakage. Prevention is easier than cure. Farmers' Bulletin No. 1178 (5 cents) not only considers the treatment of decay that is already present, but gives advice on methods of pruning and wound protection to prevent infections. Some more recent information on wound dressings for shade trees can be secured by special request addressed to the Department at Washington, and further study of wound dressings is under way.

How large losses are caused by decay in living forest trees, and are there any measures for reducing such losses that are financially practicable?

Of the stands of saw-timber size for the country as a whole, heart rots have made worthless more than an eighth of the apparent merchantable volume. In the hardwoods most of the decay fungi get into the trees through fire scars and can be prevented by proper fire protection. Management methods may be modified in various ways to decrease the likelihood of decay. For stands that are already very defective, methods have been developed for us in the very important Douglas fir region by which the extent of internal decay can be more correctly estimated in the cruising, felling and bucking operations, this making possible more economical salvaging of the sound material. This information is available in Technical Bulletin 286 (20 cents).

When can decay be made useful rather than harmful?

The Hindus are said to credit the destructive member of their group of gods with being also the creative or constructive member. While decay is a nuisance from the standpoint of the technical use of wood, it is an essential feature in the life of a forest. Without decay fungi we should have no proper development of soil humus and dead trees and brush would accumulate till forests became impenetrable tangles. Rapid decay in the slash that remains in the woods after a logging operation is particularly advantageous, the more rapidly the slash decays the earlier the excessive forest-fire hazard is removed. Studies on rate of decay have helped foresters to choose for a number of different regions the most economical methods of slash disposal that will favor prompt decay. See Technical Bulletin 132 (5 cents).

The priced bulletins named above may be ordered from the Superintendent of Public Documents, Washington, D. C.

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BUREAU OF EDUCATION 1933-1934 PROGRAM

The Bureau of Education, realizing its opportunity for bringing the youth of the State into closer contact with conservation, has been carefully preparing its school program for the coming term. It is determined to increase its scope of usefulness so that it may reach a larger group of students than ever before.

To this end it has outlined an extensive campaign that should result in making each child in the entire school system a Nature Guardian.

It is a great privilege for the New Orleans schools to visit the Conservation Museum of Natural Resources at 237 Royal street, and to study the hundreds of specimens of fur-bearing animals, birds, fish, minerals and forestry represented therein. There they have the pleasure of seeing interesting and instructing motion pictures and of hearing trained lecturers explain the source and meaning of Louisiana's natural wealth.

Among the main features of this fall's educational program are the following:

I. Visits to the New Orleans schools at Assem-

(Continued on page 45)

CONSERVATION OF LOUISIANA MINERAL RESOURCES, 1906 TO 1918

(Continued from Page 27)

1918. Subsequent to 1918, and especially during the last four years, the Department has increasingly widened its scope of activity, and the revenue derived from conservation activities has more than paid for the cost of maintenance of the Department.

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KEEP MARSHLANDS FOR WILD FOWL

(Continued from Page 6)

rife, and both the Federal and State Governments are endeavoring to formulate programs that may in some measure alleviate the situation. To some it might not appear seemly to compare with human distress the present plight of many of the species of migratory birds. On the other hand we are dealing with a natural resource of great value to the country. There are millions of people most deeply interested in the future of the ducks and geese. Large investments have been made for the acquisition and upkeep of game refuges and public and private shooting grounds. With a full realization of these matters, it would appear altogether logical to extend to the water fowl, in the degree necessary, such aid as will even now give them surcease from the harrying conditions that menace them in many parts of our great country. Moreover, providing thus for the birds may also be a means of furthering the programs for human betterment. I make a special plea, therefore, that those thousands upon thousands of people who see something of beauty and worth in the flight of the fast-winging teal and in the ordered movement of the honker, give thought to the needs of these birds and their kind, to the end that our wild fowl may continuously receive protection adequate for their present needs and to insure bountiful numbers in the years to come.

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THE PINES AS LIVING FOSSILS OF THE PLANT WORLD

(Continued from Page 12)

dealing blasts of winter in northern climates and occupy the most precipitous slopes in the high places.

The leaves are especially constructed for such hardships, because there is little resistance to air pressure. Snow and ice readily slide off. While, on the other hand, they can endure the heat and drought quite bravely.

The pines are the most important timber trees of the world from the fact that the wood possesses the qualities of strength and elasticity combined with lightness of weight and ease of working. The wood is used in such enormous quantities that we are beginning to realize that the timber supplies are not unlimited, and, at the present rate of consumption, the destruction of pine forests is inevitable.

Fires and indiscriminate pasturing are also assisting in the process of annihilation.

So far as the production of pine timber is concerned the practice of forestry or reforestation has become a necessity.

Theodore Roosevelt said that "when you help to preserve our forests or plant new ones, you are acting the part of a good citizen."

As a natural forest tree the pine is undoubtedly doomed. It must live hereafter, if it lives at all, "as a domestic tree, the object of man's care and protection."

The pines have certainly far outlasted all of their companions of the forest and hence may very appropriately be termed the *living fossils of the Plant World.*

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Grand Canyon of Hudson River, Springs of Water and Oil from Ocean Bed, Gigantic Pinnacles Located

AN UNDERSEA CANYON, rivaling in magnitude the Grand Canyon of the Colorado; a spring sending up millions of gallons of mineral water from the ocean bottom; a pinnacle rock extending from the floor of the sea to a height greater than the Washington Monument—these and other natural phenomena as impressive as any found on dry land have been discovered by the Coast and Geodetic Survey during its 116 years of surveying the coastal waters of the United States.

R. R. Lukens, assistant chief of the division of hydrography and topography, states that the submerged canyon of the Hudson River, which lies about 50 miles off the entrance to New York harbor, is one of the most remarkable natural features revealed by the soundings of the Survey.

By taking a chart of this section of the coast it is possible to trace what geologists say was undoubtedly the course of the Hudson River millions of years ago, before the eastern seaboard subsided and brought the shore line to its present location at Sandy Hook and Coney Island.

About 50 miles from Sandy Hook soundings reveal a canyon which at one place is more than 2,400 feet deep and about 3 miles wide from rim to rim. This gorge extends for about 20 miles before it spreads out fanlike and merges with the bottom of the sea.

When Ponce de Leon was sailing along the Florida coast in search of the Fountain of Youth, he may have unknowingly sailed directly by the gigantic ocean spring which has been found two and one-half miles offshore and nine miles south of the City of St. Augustine. Here there is the unusual feature of an oceanic spring sending up millions of gallons of fresh mineral water from the sea bottom at a general depth of 55 feet.

The bubbling of the water from the spring produces a marked effect on the surface of the ocean, and it can be seen for a distance of one mile. A strong odor, quite similar to the sulphur springs of Florida, says Mr. Lukens, can sometimes be detected at a distance of two miles.

The water comes up with considerable force and creates such swirls that the officer of the Coast and Geodetic Survey who visited it reported that it was difficult to hold a boat over the spring. Mr. Lukens points out that, if the outlet of the spring were on land, it is probable that it would resemble a geyser more than a spring. The spring emerges from a hole only about 25 feet in diameter and 125 feet deep, or about 70 feet below the surrounding ocean bed.

California Oil Springs

California has a number of oil springs adjacent to her southern coasts. One of these is in the southern part of Santa Monica Bay and near the head of a deep submarine valley. The oil comes up from a depth of 75 fathoms and covers a considerable area.

Another oil spring occurs in the Santa Barbara Channel a short distance west of the City of Santa Barbara. Here the smell of petroleum was so strong that the adjacent point was named "Coal Oil Point." The men who made the early surveys of these waters stated that the smell of petroleum was almost overpowering and penetrated every part of a steamer which required about 10 minutes to pass through the coal-oil-laden atmosphere.

Gold in Alaskan Sea Bed

Nautical charts, in addition to giving the depths of the water, also show the character of the bottom. At one place in the coastal waters of Alaska the chart shows gold dust as a bottom characteristic. This occurs about 18 miles southeast of Juneau in Stephens Passage at a depth of about 600 feet. Thus far no one has devised a machine for dredging at such a great depth.

A curious feature of the waters of Alaska, points out Mr. Lukens, are the pinnacle rocks. These lurking dangers often extend to within a few feet of the surface and have been the cause of many shipwrecks. The menace of these pinnacles was so great that the main ship channels of southeastern Alaska have been swept by the wire drag, and the pinnacles thus discovered are now charted.

One pinnacle has been found which rises from a general depth of 600 feet to within 17 feet of the surface. This pinnacle, higher than the

Washington Monument, has been called the "Washington Monument Rock."

SUBMARINE VOLCANO

In addition to many spectacular volcanoes on land, Alaska has a submarine volcano. This is known as Bogoslof and is located in Bering Sea about 60 miles west of the village of Unalaska and approximately 25 miles north of Umnak Island. It is out of line of traffic and is visited only by an occasional cutter on patrol duty.

Bogoslof rises up from depths of nearly 6,000 feet. It throws up islands and then blasts them away with terrific explosions. Nearly every year there are great differences in the appearance of the island. It is so seldom visited that it is possible many of the eruptions have gone unrecorded, believes Mr. Lukens. Records are available of eruptions in 1796, 1883, 1906, and 1910.

The eruption of 1910 was witnessed by the officers of the "Tahoma," who reported a column of steam and ashes many thousands of feet high. Of recent years great changes in the topography of Bogoslof have been reported, but no violent eruptions have been recorded.

CONSERVATION ALONE CAN PREVENT "LAST POST" FOR WILD LIFE

(Continued from Page 20)

mated merely in aesthetic terms for they have tremendous practical value.

The manifold activities of the Department of Conservation of the State of Louisiana have been energetically pursued so that there may converge upon the problem of saving the wonderful wild life of our State, every available and beneficial influence.

"TAKE" OF FUR SEAL BEST IN 44 YEARS

Pribilof Herd Has Multiplied Tenfold Under Bureau of Fisheries Since 1911

Fur seals in the Pribilof Islands herd have increased nearly 10-fold since the Bureau of Fisheries took over supervision of this valuable asset in 1911. The take of fur seal skins this season was the greatest in 44 years.

This year 54,550 skins were taken, as compared with 49,336 skins last season. Under the terms of the treaty whereby the United States Government assumed control of the Pribilof herd, both Japan and Canada are entitled to 15 per cent of the skins secured.

In past years, according to the Bureau of Fisheries, these countries have taken 15 per cent of the net proceeds after the sale of the finished skins, but this year Canada has indicated an intention to take 15 per cent of the unfinished skins.

When the Bureau took over supervision and regulation of the seal herd it numbered but 135,000 animals. Notwithstanding that more than 500,000 seals have been killed from the surplus of 3-year-old males since 1910, the herd has increased to a total of about 1,300,000 animals, the Bureau reports. The prohibition against killing seals on the high seas has contributed materially toward the increase, according to the Bureau.

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New National Conservation Policy of Developing Natural Resources

A Gigantic Project in the Tennessee Valley to Arise; Preventing Erosion to Save the Soil and Check Floods

By DAVID E. LILIENTHAL
Director and General Counsel, Tennessee Valley Authority

PRESIDENT ROOSEVELT has formulated and expressed a new national policy for the protection and development of the natural resources of our country—a plan which marks the beginning of a new period in American economic and political history.

The Government's great wartime electric generating station at Muscle Shoals was to be put to the use of the people of that area. But that power station, the President said, is "but a small part of the potential public usefulness of the entire Tennessee River. Such use, if envisioned in its entirety, transcends mere power development; it enters the wide fields of other natural resources of this valley nation from agricultural use of marginal lands and distribution of and diversification of industry."

The conservation of natural resources in the past has been concerned in the main with the desperate struggle to prevent the physical destruction of our natural heritage. We now enter on a new period, in which the protection of natural resources is but a part of the picture. We are now committed to a national policy to begin in this giant valley of the Tennessee, of developing to the highest and best use for all our people the resources with which a bountiful Providence has endowed us.

OUR GREATEST NATURAL RESOURCE: THE SOIL

We have come to think of natural resources principally in terms of our forests and our minerals. But our greatest natural resource, except of course the people of the country themselves, is the soil. The soil is in real earnest the very basis and foundation of our life. And that soil is being rapidly destroyed. This, our greatest natural resource, is being misused, mismanaged and, in truth, being actually destroyed at an appalling rate.

Every year in this country erosion destroys soil equivalent to the total tillable area used for the growing of crops in the entire nation of Japan. Seventy-five per cent of all the land in cultivation in our country is being seriously affected by the forces of erosion.

In the Tennessee Valley, land in many places is cultivated on slopes so steep that the farmers actually anticipate that the tillable soil will be washed off in from three to ten years—a soil which takes several centuries to rebuild. The greatest tragedy of all this is that with such destruction going on, these men labor under intolerable conditions and secure the niggardly yield from these slopes of 10 bushels of corn and eight bushels of wheat to an acre.

Now what does the new conservation policy provide to meet this appalling loss, under the provisions of the Tennessee Valley Authority Act of 1933?

Fundamentally the problem is one of planning by governmental agencies, State and Federal, and for the Authority. The first step is the inventory and the classification of the land in the Tennessee Valley. Those lands that are subject to this appalling erosion should not be used for open cultivation, but should be covered by some form of plant life that will hold the moisture and thereby prevent erosion.

Instead of men wearing their lives out to get a precarious living out of lands not really suited for farming, the valley should be chartered and planned so that agriculture will be carried on only on the land best adapted to it. This may involve vast governmental acquisition of so-called submarginal lands, and transfer of some farmers to lands better adapted to farming than those on which they live. Translating these objectives into action is definitely a part of the duties of the Tennessee Valley Authority.

ONLY THE BEST LAND FOR AGRICULTURAL USES

It is no criticism of such a program of the planned development of our soil resources to say that we have already too much land in production. The point of the President's policy is that whatever the area of land now used for agricultural purposes is, it is only that land which is best adapted to agricultural purposes that should be used for farming. The vast areas of land now used for farming on a precarious and socially wasteful basis should be returned to their best use—whether grazing or forestry—so that our soil may be conserved and men shall not try to sustain life against hopeless odds.

In the President's plan for the development of the Tennessee Valley, there is another principal natural resource—electric power. On the Tennessee River is the mile-wide Wilson Dam at Muscle Shoals, Alabama, built during war-time for the production of nitrates and fertilizers needed for the war. For the past 15 years and more it has been little used, and has been the storm center of many congressional debates. The President saw that here was a natural resource which should be developed as a necessary and integral part of the development of the other natural resources of this valley empire.

The Roosevelt-Norris proposal, enacted into law, directs the operation of this power plant and the distribution of the electricity there produced. It further provides for the construction of other dams by the Authority in the Valley, and the generation and distribution of power from such additional dams. The Valley Authority is directed to make experimentations and studies to develop this natural resource of electric power as a means of taking from the backs of men and women in the Valley some of their ancient and arduous burdens. Here is a recognition that electric power, if available at low cost, is a resource which can be used in the planning of a region and its rational development.

The power development at Muscle Shoals and that under way on the Clinch River in Tennessee is an inseparable part of the other objectives which the President had in mind—particularly the control of floods and the protection of the soil from destructive erosion. For these great dams act as reservoirs, whereby flood waters may be controlled and destructive floods eliminated or minimized.

There is this further interrelation between flood control, the development of power resources, and the conservation of the soil. If these reservoirs built to prevent destructive floods and to produce electricity are not to be themselves destroyed, the fight against soil erosion must go forward; otherwise, the soil washed into the river will be in a relatively short number of years appreciably filled up, and to that extent destroy these reservoirs themselves. For example: The Roosevelt Irrigation Dam in Arizona, while only 17 years old, has already lost one-sixth of its capacity by reason of the filling up with silt—and this in a region in which the rainfall is not great, although torrential.

The development of these two natural resources of power and of soil, therefore, dovetail together into a single policy of development of resources—the power dam serving to control floods, the soil erosion measure serving to protect the life of the power dam, and the power resources aiding in the development of all the human and material resources of the valley.

We are at the very beginning of the power age. In my judgment we have not yet begun to tap the possibilities of the use of power as a means of increasing the income of our people and of lightening the burdens which fall so heavily on many of them.

This presupposes, however, that power can be sold for lower rates than has been thus far the case. Only in this way is it feasible that power may be used for an infinite variety of uses and with greatest freedom. We may reasonably anticipate that the President's plan for the Tennessee Valley may greatly hasten the day when low-cost power will be a humane and a liberating force, bringing with it every manner of economic and social benefit to our people.

* * *

POLLUTION INVESTIGATIONS

(Continued from Page 1)

program upon which the Department of Conservation is now engaged.

The Department of Conservation has now provided the necessary facilities for this work by establishing, in a rich oyster area where no pollution has yet occurred, a laboratory provided with running sea water. The conditions indispensable for the scientific investigation of pollution are thus available for the first time in the history of the Department of Conservation. The subsequent value of these facilities, in the opportunity they will give for the investigation of other very practical questions concerning the welfare of our marine commercial resources, cannot easily be over-estimated.

Concurrently, there is being conducted by the Bureau of Fisheries of the Department of Commerce of Washington, D. C., a program of research also designed to shed light upon these problems.

It is hoped that out of these studies, pioneer as they are in this particular field, there will become available some of the needed facts that will make possible a procedure of exploitation of the valuable oil resources of Louisiana without damage to the also valuable fishery and oyster resources of our State.

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Geological Bulletin No. 3, "Geology of Lafayette and St. Martin Parishes," Available for Distribution

The study, entitled "Geology of Lafayette and St. Martin Parishes," by Henry V. Howe and Cyril K. Moresi, is the third of a series of bulletins which are being prepared by the School of Geology, Louisiana State University, and the Bureau of Scientific Research and Statistics, Minerals Section, of the Department of Conservation, on the geology of Louisiana. Iberia Parish was selected as the subject of Geological Bulletin No. 1. The second study, Geological Bulletin No. 2, is entitled "Foraminifera of the Jackson Eocene at Danville Landing, on the Ouachita, Catahoula Parish, Louisiana."

The report on the geology of Lafayette and St. Martin Parishes begins with a brief historical outline followed by a description of the location and boundaries of the parishes, with numerous illustrations and photographs. Lafayette and St. Martin Parishes are a part of what was known during the French and Spanish reign of Louisiana as the "Attakapas Country," which region embraced the great stretch of country west of the Atchafalaya to the Calcasieu River, and south from the Avoyelles country to the Gulf of Mexico.

These parishes lie at the junction of the western edge of the overflow region of the Mississippi delta and the slightly higher late-Pleistocene Pensacola (?) and Hammond (?) terraces. The line of separation between the Hammond (?) terrace and the slightly lower Mississippi flood-plain region to the east is marked by an escarpment. This escarpment cuts both [Hammond (?) and Pensacola (?)] terraces and must have been formed by the Mississippi either during the last half of the Wisconsin glacial advance, or by lateral migration accompanying the formation of present delta at some time since the last glacial stage. The region occupied by these two parishes is divided into five physiographic provinces; Hammond Terrace (?), Pensacola Terrace (?), Bayou Teche Terrane, Atchafalaya Basin, and Peat Lands—these physiographic provinces are taken up in order of their development. The principal streams of these two parishes belong to three drainage systems; Atchafalaya drainage system, Bayou Teche drainage system, and the Vermilion River and its tributaries. Each of these major streams is of a distinct type and has certain characteristics worthy of mention.

A list of elevations which were supplied by the U. S. Coast and Geodetic Survey is included. No change in elevations have taken place between 1906, when the bench-marks were established by G. D. Harris, and 1918, when they were re-run by the U. S. Coast and Geodetic Survey. Topographic quadrangles, which have been recently published by the Mississippi River Commission, cover the entire area of St. Martin Parish and the extreme eastern portion of Lafayette Parish.

Lafayette and St. Martin Parishes are located near the center of the Gulf-ward plunging Mississippi Valley synclinal trough. With the possible exception of the material exposed at the surface of the circular mound at Anse La Butte, the entire surface of both parishes is covered by Pleistocene and younger deposits. The underlying Tertiary and Mesozoic sediments are thought to reach a thickness of more than 25,000 feet. Through this five mile column of Mesozoic and Cenozoic sediments the salt-plug of Anse La Butte has been pushed to within a few hundred feet of the surface and the salt plugs of the other domes have risen to almost as great a distance. Aside from the salt which has been encountered in wells on Anse La Butte, Bayou Bouillon, and Section 28 domes, the oldest sedimentary formation encountered in wells is known as a single core of fossiliferous lower Jackson Eocene obtained from the Ayers Brothers' well on Anse La Butte at a depth of 1500 feet and this bed must have been carried upward along with the core at least 9000 feet above its normal position.

Three salt domes, Anse La Butte, Bayou Bouillon, and Section 28, lie within the boundaries of

St. Martin Parish. The surface indications of gas seepages and paraffin dirt led to their discovery. The Anse La Butte dome was one of the first areas in the State which aroused attention in the petroleum industry. The surface of the Anse La Butte dome consists of a circular mound rising some 17 feet above flanking depressions. The other two domes, Bayou Bouillon and Section 28 domes, lie within the physiographic area of the Atchafalaya flood-plain and have no surface expression. The Bayou Bouillon dome may be considered a typical swamp field as the area it occupies is traversed by the Atchafalaya River and numerous lakes and bayous. Section 28 dome lies at the western edge of the Atchafalaya flood-plain in the area subject to inundation during the flood periods of the year. However, with the recent construction of the Henderson-Catahoula levee system the area of the Section 28 dome should be accessible by road throughout the year. The Anse La Butte dome has been producing oil in small quantities for more than 30 years. However, at the present time the production is less than 50 barrels of oil per day. Small quantities of oil had been produced from the Bayou Bouillon dome as early as 1902, but it was not until 1928 that this field became an important oil producer. The field was abandoned in September, 1931. Anse La Butte, Bayou Bouillon, and Section 28 domes have been studied in detail in regard to location, history of development, surface and subsurface geology, shape and extent of the salt core, cap-rock, and production record. Cross sections of each dome were constructed on the basis of well logs and paleontological determinations. Maps were compiled from all available data.

Prospecting for petroleum has been almost continuous in Lafayette and St. Martin Parishes since the discovery of oil at Anse La Butte more than 30 years ago. In the early years of this century, wells were usually located near supposed gas seepages or in the neighborhood of exposures of paraffin dirt. The success of geophysical methods in locating salt domes within the Gulf Coast province in recent years has renewed interest in the petroleum possibilities of these two parishes. Geophysical surveys in this area have been made at intervals since the preliminary campaign of 1926, and are in progress at the present time.

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A complete history of the geophysical exploration of these two parishes is not available. However, this study presents a short review of several areas in these parishes which have attracted attention in recent years as possible petroleum prospects.

The known commercial mineral resources of St. Martin Parish consist of brick clay, petroleum, salt, and underground waters. Lafayette Parish is blessed with abundant artesian water supplies and has clay deposits which could be used for common bricks. Recent geophysical surveys have attracted attention to both parishes as regions which may contain potential undeveloped oil fields. A summary of each of these mineral resources and a detailed discussion of the occurrence and production of oil and salt on the salt domes of St. Martin Parish is given in this bulletin.

The report contains a bibilography of 152 titles, which includes references having a definite bearing on the geology of these parishes. It includes, also, references to papers dealing with the Pleistocene terraces of the Gulf Coast, with Mississippi River sedimentation, and with the upper Tertiary formations of south Louisiana. Each reference is annotated so as to give the reader its bearing or contribution to the geology of this area.

AVAILABLE PUBLICATIONS OF THE DEPARTMENT OF CONSERVATION DEALING WITH THE GEOLOGY AND MINERAL RESOURCES OF LOUISIANA*

GEOLOGICAL BULLETINS

Geology of Iberia Parish, 1931, Geological Bulletin No. 1
by
Henry V. Howe and Cyril K. Moresi
Foraminifera of the Jackson Eocene, 1932, Geological Bulletin No. 2
by
Henry V. Howe and William E. Wallace
Geology of Lafayette and St. Martin Parishes, 1933, Geological Bulletin No. 3
by
Henry V. Howe and Cyril K. Moresi

MINERALS DIVISION BULLETINS

The Clays of Louisiana
Shreveport Area, 1927, Bulletin No. 14
Monroe Area, 1928, Bulletin No. 16
Alexandria Area, 1929, Bulletin No. 19
by
J. W. Whittemore
The Monroe Gas Field, 1921, Bulletin No. 12
by
H. W. Bell
The Conservation Laws in Relation to Minerals, 1930
by
James P. Guillot and Nicole E. Simoneaux
General Bulletin of the Minerals Division (Handbook), 1933, Bulletin No. 22, 345 pages

BUREAU OF EDUCATION 1933-1934 PROGRAM

(Continued from page 37)

bly periods by various experts in the Conservation Department to discuss the purpose of the Louisiana Nature Guardian work, to organize Clubs, to acquaint the teachers with the lecture service at the Museum, and to arrange schedules for the various classes in each school to visit it at an early and convenient time.

II. Lecture and motion picture service for Girl and Boy Scouts, Camp Fire Girls, Rainbow Girls, and other such organizations.

III. Lecture and motion picture service for men and women's clubs and organizations.

IV. Cooperation with Chamber of Commerce, civic groups and business organizations.

V. Improved plans for exhibits at State fairs.

VI. Visits to the schools of the outlying parishes by the Department's lecturers, who will carry an adequate collection of specimens of the State's natural resources, and who will distribute educational literature descriptive of Louisiana's natural gifts.

VII. Revision and publication of various educational bulletins and careful distribution of same.

VIII. Material and programs for various State days, such as "Bird Day" and "Wild Life Day" kept up-to-date, and prepared well in advance of celebration.

IX. Mailing list kept current.

X. Plans to further a constant and close contact between the schools and the Bureau at all times, and to encourage the teachers of the State and City to make use of all the facilities of the Conservation Department.

XI. Cooperation and contact with all the Civilian Conservation Corps Camps located in the State.

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*Owing to the size and expense of printing these bulletins free distribution cannot be made by mail. All persons wishing copies of these publications mailed to them should send twenty-five cents in stamps or coin to cover the cost of mailing.

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A LOUISIANA SWAMP

By *Sena D. Furlow*

Down in the valley of the South-land
Dwells a languorous Beauty, by the world untouched,
In luxuriant splendor—weaves a Mystery,
Softly blending a sweet toned Symphony,
Under the loving rays
Of a warm golden sun,
Down in Louisiana
Where the tapestry of dreams is spun.

Lending enchantment, magnificent oaks,
Draped in graceful mantillas of lacey moss;
Stately Grand Dames of the Spanish Regime,
Ladies in waiting to the Court of Time——
Under the watchful eye
Of a pale yellow moon,
Down in Louisiana
On the banks of a drowsy lagoon.

Smilax, wild ivy, and jasmine vines
Wreathing garlands——tenderly drooping
Over still, listless waters of a mirrored sheen,
A magic loveliness—silent and serene—
Under the hyacinths
Of a pale lavender hue,
Down in Louisiana
On the banks of a dreamy bayou.

And there are the grand old cypress trees,
Battling with the ages—holding their own,
Weather-beaten old soldiers, stalwart and fine—
Sentinels in waiting, beyond the firing line,
With bayonets outstretched
Against a starlit sky,
Down in Louisiana
On the banks where the hoot owls cry.

The Swamp is a passive dreamy-eyed Beauty,
Nestling in her bed of lillies and grass,
Flaunting her charms in exotic madness——
A wistful waiting in a lingering sadness,
Under the watchful eye
Of a pale yellow moon,
Down in Louisiana
On the banks of a drowsy lagoon.

(Copyright 1933 by Sena D. Furlow.)

Commissioner Maestri Approves and Adopts Regulations Governing Pollution of Public Waters

Acting upon the recommendations of the department's Bureau of Scientific Research and Statistics, and with authority vested in him under the provisions of Section 2 of Act 127 of 1912 (General Conservation Act Creating the Louisiana Conservation Commission), the Commissioner has approved and adopted certain regulations governing pollution of public waters.

Act 127 of 1912 authorizes the Commissioner to adopt rules and regulations for the comprehensive control and protection of birds, fish, shell fish, wild quadrupeds and mineral, soil and other natural resources of the state. Section 2 of the act further provides that one of the purposes for which the Conservation Commission of Louisiana is created a department of the state government is for the purpose of protection, management and conservation of the oyster fields and water bottoms of the state; and to protect the birds, fish, shell fish and wild quadrupeds of the state.

REGULATIONS

The following regulations shall become effective November 1, 1933:

1. No person, company, corporation or other organization shall introduce or permit to be introduced into the streams or fresh waters of the state of Louisiana from any source or activity, subject to their control, any waste or other matter which will render the water:
    a. harmful or distasteful when used for drinking purposes by men or animals;
    b. or which will be harmful to aquatic life or which will affect their market or food value;
    c. or which will so change the chemical composition of the water as to render unsuitable its use for irrigation purposes;
    d. or which will form a film on the surface of the water.
2. No person, company, corporation or other organization shall introduce or permit to be introduced, without the express written authorization of the Commissioner of Conservation, into the coastal or other waters of the state of Louisiana from any source or activity, subject to their control, any waste or other matter which will change the chemical composition of the waters; and which, in the opinion of the Commissioner of Conservation, is harmful to aquatic or other wild life, and which may affect their market or food value.

The foregoing are promulgated as regulations of the Department of Conservation, State of Louisiana, under authority of Act 127 of 1912, and hereby adopted effective November 1, 1933, the provisions of which are to be complied with within ten days from the date of its adoption.

STATE OF LOUISIANA
DEPARTMENT OF CONSERVATION
By ROB'T. S. MAESTRI,
Commissioner.

JAMES P. GUILLOT,
Secretary
September 28, 1933.

Submitted and approved, La. Dept. of Justice, James O'Conner, Asst. Att'y. General.

Louisiana Birds---For Hunters and Others

By JAMES NELSON GOWANLOCH
Chief Biologist, Bureau of Research and Statistics, Department of Conservation

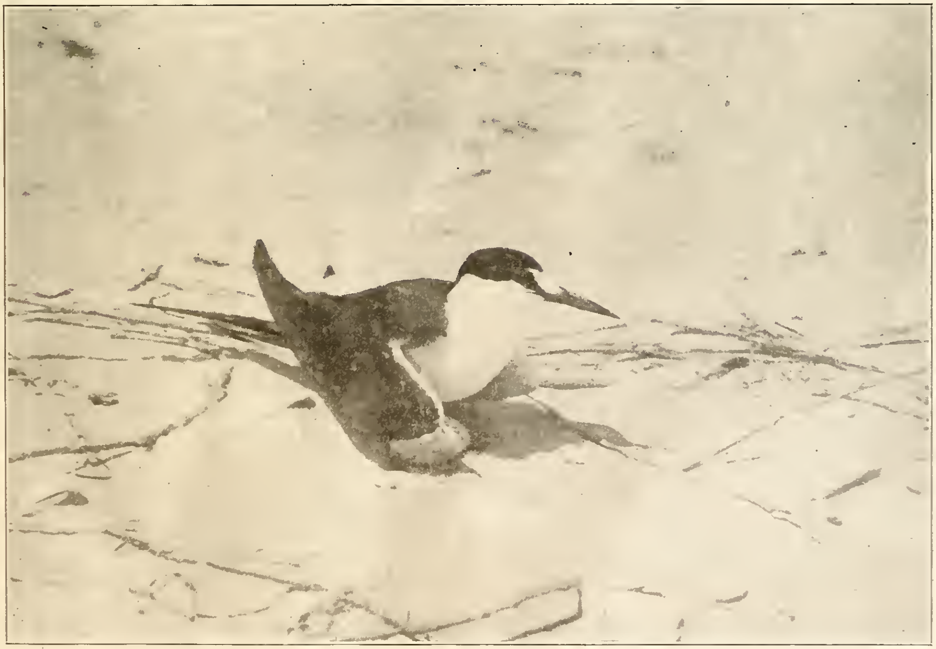
THE thoughts of many men who are not in any ordinary sense bird students turn in anticipation of the hunting season to a consideration of certain of our Louisiana birds, but in a larger perspective it must be realized that game birds—even the magnificent hunting provided by our remarkable water fowl resources—represent only a part, and a small part at that, of the marvelous bird life of our State.

Emerson, it was, who long ago said that if the stars (of Heaven and not of Hollywood) shone only once in a thousand years the people of Earth would stay awake all night to behold them. So too with the birds; the familiar becomes as all too often the commonplace. The Cardinal, that in a land where it is a stranger, would evoke profound wonder, is often considered not worth the second glance.

Louisiana has a wealth of bird life that few of our State's citizens appreciate. If, for example, the birds of North America be examined it will be found that they form seventy-five separate bird families, some of which families are European or Asiatic and are represented in North America only by stragglers. If now we consider the birds of Louisiana we discover the surprising fact that sixty of the seventy-five bird families ever yet observed in North America actually occur within the boundaries of Louisiana itself. Thus, in other words, eighty per cent of the total North America avifauna, as far as bird families are concerned, we may claim as our own.

Birds are remarkable animals, playing in the economy of man's affairs a highly important part since by their activities they destroy weed seeds and insects, the enemies of agriculture. Few indeed of our Louisiana birds are such rascals that they merit destruction rather than protection. Even our sea birds, like the Gulls and Terns, have been found to feed chiefly upon fishes that are of no interest either as sport or food species for man.

(Continued on Page 48)



Photograph by James Nelson Gowanloch

A RARE LOUISIANA NESTING SPECIES

A female Eastern Sooty Tern, *Sterna fuscata fuscata* Linnaeus, photographed at her nest on Curlew Island, Chandeleur Sound, Louisiana, June 5th, 1933. This beautiful sea bird has hitherto been definitely reported as not breeding in Louisiana. The nest constructed by this individual consisted simply of a shallow depression in the sand beach of one of the low barrier islands of Chandeleur Sound. An extraordinarily "tame" species, this bird characteristically permitted the close approach of observers so that it was possible, without the use of a hiding tent, to stand within five feet of this Sooty Tern while she, quite unperturbed, continued the incubation of her single egg.

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Get Your Limit on Ducks!

The Department of Conservation, of the State of Louisiana, cordially invites you to visit the Pass-a-Loutre Public Shooting club under its direction at the mouth of the Mississippi River, during the season of 1933-1934, November 16 to January 15.

The club house is adequately appointed for the entertainment of guests, being supplied with a comfortable dormitory, a light plant, a water supply system furnishing hot and cold water, and a cuisine under the management of competent help.

The many ponds have been opened with trails leading from the main passes; the equipment, such as duck boats, decoys, and blinds, has been put in proper shape for the season.

Opening Day at the Pass-a-Loutre Hunting Club, November 1, 1925

The hunting of wild waterfowl is permitted only from a half hour before sunrise to noon. This gives the ducks a half-day rest for feeding in the ponds.

The Pass-a-Loutre Club is located near the mouth of the Mississippi, on one of the passes of the river, 90 miles from the City of New Orleans.

The Club can be reached by bus line over a good highway leading out of New Orleans to Venice Post Office, situated on the west bank of the Mississippi River, at which point our boat will meet all guests each day at 2:30 P. M. o'clock.

At the club house the daily charge is $9.00. This covers services of guide, duckboat, decoys, breakfast, lunch, dinner, and lodgings. Sportsmen must bring their own guns, but shells for standard 12, 16, and 20 gauge guns can be purchased at the club house at retail prices.

Sportsmen desiring to visit the club must register, either in person or by mail, at the office of the Department of Conservation, 126 Civil Court Building, N. O.

For full information relative to registration and accommodation, apply to

DEPARTMENT OF CONSERVATION
126 Civil Court Building New Orleans

LOUISIANA BIRDS

(Continued from Page 47)

Economic considerations, important though they are, measure less than that greater value of birds, the beauty and charm which these creatures add to our life. It is hard to imagine the changing seasons without their changing pageant of birds. Rich among all childhood memories are those vivid pictures of bright and cheerful birds, seen through eyes discovering for the first time the wide wonder of the world.

Louisiana can proudly claim among her avifauna some of the Continent's most beautiful and most spectacular species. There is to be found, for example, within our State the only member of the Stork family occurring in North America, the Wood Ibis, together with such beautiful water birds as the lace-like Snowy Egret, the Louisiana Heron, the Great Blue Heron and the marvelously tinted Roseate Spoonbill, better known in popular local language as the "Pink Bird."

Here, as elsewhere, wealth brings responsibility and our wealth of bird life must call forth an equivalent responsibility of protection. The Passenger Pigeon and the Carolina Parakeet, once abundant Louisiana birds, have both travelled the sad path into complete extinction. Nothing can now recall them. The Eskimo Curlew, once a most prized Louisiana game bird during springtime migrations, is also probably to be counted among those species irrevocably lost. We have here within our state the only present definitely known surviving individuals of North America's largest and most magnificent Woodpecker, the remarkable Ivory-bills which the writer has himself beheld in the sombre and impressive setting of the big timber.

Conservation alone can save for future generations the beauty that our birds bring. Conservation means much more than laws, much more even than the mere observance of laws. It means the education of children to a sense of proprietorship in our wild life so that they will come to observe the protective laws not through compulsion from without but through urge from within. Such educational work the Department of Conservation is vigorously conducting through its alert Bureau of Education and the widening influence of accomplished success, already apparent, is impossible of measurement in terms of ultimate influence.

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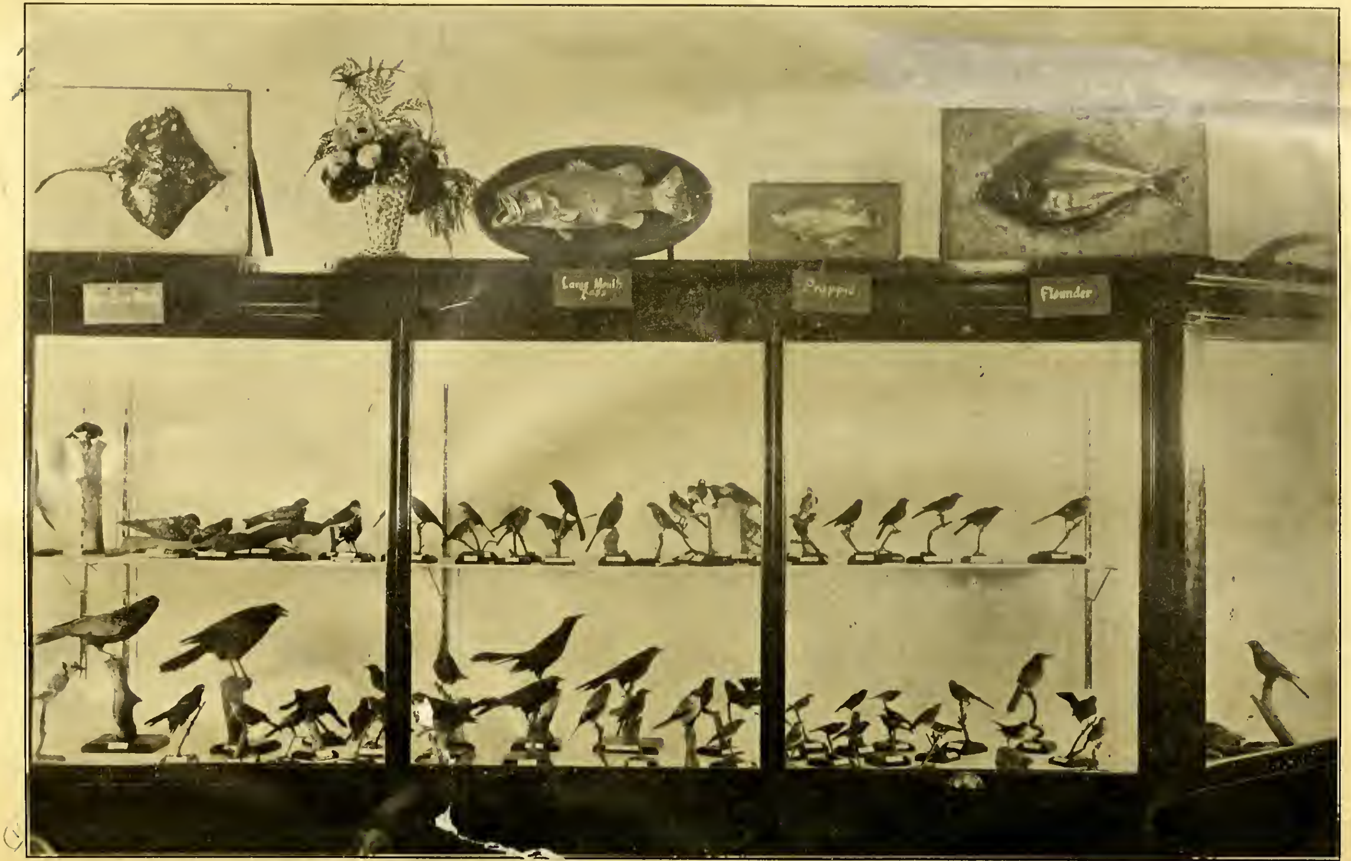

Some Louisiana Birds that Audubon Loved. (Conservation Museum, New Orleans.)

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